

◀ Answer the following questions :

1 Choose the correct answer from those given :

1 One of the solutions for the two equations : $X - y = 2$, $X^2 + y^2 = 20$

in $\mathbb{R} \times \mathbb{R}$ is

- (a) $(-4, 2)$ (b) $(2, -4)$ (c) $(3, 1)$ (d) $(4, 2)$

2 If $A \cap B = \emptyset$, then $P(A - B) =$

- (a) $P(A)$ (b) $P(B)$ (c) $P(B - A)$ (d) 1

3 If $X^2 + kX - 21 = (X - 3)(X + 7)$, then $k =$

- (a) -2 (b) 4 (c) 8 (d) 20

4 If $\frac{1}{x} + \frac{1}{y} + \frac{1}{xy} = \frac{k}{xy}$, then $k =$

- (a) 2 (b) 3 (c) $x + y + 1$ (d) $x + y$

5 If $5^{x-3} = 1$, then $2x^2 =$

- (a) 36 (b) 9 (c) 18 (d) 3

6 If the width of the rectangle is 3 cm. , and its diagonal length is 5 cm. ,

then its length is cm.

- (a) 2 (b) $\frac{5}{3}$ (c) 4 (d) $\frac{3}{5}$

2 [a] By using the general formula , find in \mathbb{R} the solution set of the equation : $X(X-2)=1$

[b] If $n(X) = \frac{x^3 + x}{x^2 + 1} + \frac{x^2 + 2x + 4}{x^3 - 8}$, find $n(X)$ in the simplest form , showing the domain.

3 [a] If the set of zeroes of the function $f : f(X) = \frac{x^2 - ax + 9}{bx + 4}$ is $\{3\}$ and its domain is $\mathbb{R} - \{2\}$

, find the value of each of a and b

[b] If $n(X) = \frac{x^3 - 8}{x^2 - 3x + 2} \div \frac{x^3 + 2x^2 + 4x}{2x^2 + x - 3}$, find $n(X)$ in the simplest form , showing the domain.

4 [a] If $n_1(X) = \frac{x^2 + 5x + 6}{x^2 + x - 2}$ and $n_2(X) = \frac{x^2 - 2x - 15}{x^2 - 6x + 5}$, is $n_1 = n_2$? and why ?

[b] If A and B are two events of the sample space of a random experiment , and

$P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{5}{8}$, find each of the following :

- 1** $P(A \cap B)$ **2** $P(B - A)$ **3** $P(A \cup B)$

5 [a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$$x - y = 3 \quad , \quad y^2 - xy = 21$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically or graphically : $y = x + 4 \quad , \quad x + y = 4$

Answer the following questions :

1 Choose the correct answer from those given :

- 1** In the experiment of tossing a piece of coin once , if A is the event of appearance of a head , B is the event of appearance of a tail , then $P(A \cup B) = \dots$
 - (a) $\frac{1}{2}$
 - (b) 1
 - (c) zero
 - (d) \emptyset
- 2** The number of solutions of the equation $x - y = 0$ in $\mathbb{R} \times \mathbb{R}$ is \dots
 - (a) 1
 - (b) 2
 - (c) 3
 - (d) infinite
- 3** The set of zeroes of $f : f(x) = \frac{-3}{x-2}$ is \dots
 - (a) $\mathbb{R} - \{2\}$
 - (b) $\mathbb{R} - \{3\}$
 - (c) $\{2\}$
 - (d) \emptyset
- 4** If the curve of the quadratic function f passes through the points $(-1, 0), (0, -4)$, $(4, 0)$, then the solution set of the equation $f(x) = 0$ in \mathbb{R} is \dots
 - (a) $\{-1, 0\}$
 - (b) $\{-4, 0\}$
 - (c) $\{-1, 4\}$
 - (d) $\{4, -4\}$
- 5** If $2^{x+1} = 1$, then $x \in \dots$
 - (a) $\{0\}$
 - (b) $\{0, 1\}$
 - (c) $\{-1\}$
 - (d) $\mathbb{R} - \{-1\}$
- 6** If $\sqrt{x^2} = 25$, then $x = \dots$
 - (a) 5
 - (b) ± 5
 - (c) 25
 - (d) ± 25

2 [a] If A , B are two events in a random experiment and $P(A) = 0.6$, $P(B) = 0.5$, $P(A \cap B) = 0.3$, find : $P(A \cup B)$, $P(\bar{B})$

[b] Simplify to the simplest form , showing the domain :

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

3 [a] By using the general formula , find in \mathbb{R} the solution set of the equation :

$3x^2 - 6x = -1$ (approximating the result to the nearest two decimals)

[b] If the domain of the function n is $\mathbb{R} - \{3\}$ where $n(x) = \frac{x-1}{x^2 - ax + 9}$, find the value of a

4 [a] Find the solution set of the following two equations together in $\mathbb{R} \times \mathbb{R}$:

$$y - x = 2 \quad , \quad x^2 + xy - 4 = 0$$

[b] Find $n(x)$ in the simplest form , showing the domain of n :

$$n(x) = \frac{x-3}{x^2 - 7x + 12} - \frac{x-3}{3-x}$$

5 [a] Two acute angles in a right-angled triangle. The difference between their measures is 50°

Find the measure of each angle.

[b] If $n(x) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$, find :

1 $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

2 The value of x if $n^{-1}(x) = 3$

Answer the following questions :

1 Choose the correct answer from those given :

1 If $n(x) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$, then the domain of n^{-1} is

- (a) \mathbb{R} (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{0, 2\}$

2 If A and B are two mutually exclusive events from the sample space S of a random experiment, then $P(A - B) =$

- (a) $P(B)$ (b) $P(A)$ (c) $P(\bar{A})$ (d) $P(\bar{B})$

3 In the equation : $a x^2 + b x + c = 0$, if : $b^2 - 4ac > 0$, then the equation has roots in \mathbb{R}

- (a) 1 (b) 2 (c) zero (d) ∞

4 The rule which describes the pattern $(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots)$ where $n \in \mathbb{Z}_+$ is

- (a) $\frac{2}{n+1}$ (b) $n + \frac{1}{2}$ (c) $\frac{n}{n+1}$ (d) $\frac{2n-1}{n+1}$

5 If $2^7 \times 3^7 = 6^k$, then $k =$

- (a) 14 (b) 7 (c) 6 (d) 5

6 If $3^x = 4$, $4^y = 12$, then $\frac{xy}{x+1} =$

- (a) 2 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

2 [a] If A, B are two events from the sample space of a random experiment and

$P(A) = 0.7$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$

, find : $P(\bar{A})$, $P(A - B)$ and $P(A \cup B)$

[b] If the set of zeroes of the function f where $f(x) = x^2 - 10x + a$ is $\{5\}$

, then find the value of a

3 [a] Find the S.S. in \mathbb{R}^2 of the two equations : $x + y = 2$, $\frac{1}{x} + \frac{1}{y} = 2$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$,

prove that : $n_1 = n_2$

4 [a] Find $n(x)$ in the simplest form and state the domain if :

$$n(x) = \frac{x^2 - 3x}{2x^2 - x - 6} \div \frac{2x^2 - 3x}{4x^2 - 9}$$

[b] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x + 2y = 8 \quad , \quad 3x + y = 9$$

5 [a] Using the general rule , find the solution set of the following equation in \mathbb{R} :

$$2x^2 - 5x + 1 = 0$$

[b] Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 + 2x}{x^2 - 4} - \frac{2x - 6}{x^2 - 5x + 6}$$

Answers of model 1

1

[1] d

[2] a

[3] b

[4] c

[5] c

[6] c

2

[a] $\because x(x-2)=1 \quad \therefore x^2 - 2x - 1 = 0$

$\therefore a=1, b=-2, c=-1$

$$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2 \times 1}$$

$$= \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$$

$\therefore x = 1 + \sqrt{2} \text{ or } x = 1 - \sqrt{2}$

$\therefore \text{The S.S.} = \{1 + \sqrt{2}, 1 - \sqrt{2}\}$

[b] $\because n(x) = \frac{x(x^2+1)}{x^2+1} + \frac{x^2+2x+4}{(x-2)(x^2+2x+4)}$

$\therefore \text{The domain of } n = \mathbb{R} - \{2\}$

$$, n(x) = x + \frac{1}{x-2} = \frac{x(x-2)+1}{x-2}$$

$$= \frac{x^2-2x+1}{x-2} = \frac{(x-1)^2}{x-2}$$

3

[a] $\because z(f) = \{3\} \quad \therefore \text{At } x=3$

$\therefore x^2 - ax + 9 = 0 \quad \therefore 3^2 - a \times 3 + 9 = 0$

$\therefore 9 - 3a + 9 = 0 \quad \therefore -3a = -18 \quad \therefore a = 6$

$, \therefore \text{The domain of } f = \mathbb{R} - \{2\}$

$\therefore \text{At } x=2 \quad \therefore bx+4=0$

$\therefore 2b+4=0 \quad \therefore 2b=-4 \quad \therefore b=-2$

[b] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x-1)} \div \frac{x(x^2+2x+4)}{(2x+3)(x-1)}$

$\therefore \text{The domain of } n = \mathbb{R} - \{2, 1, 0, -\frac{3}{2}\}$

$$, n(x) = \frac{x^2+2x+4}{x-1} \times \frac{(2x+3)(x-1)}{x(x^2+2x+4)} = \frac{2x+3}{x}$$

4

[a] $\because n_1 = \frac{(x+3)(x+2)}{(x+2)(x-1)}$

$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-2, 1\}$

$$, n_1(x) = \frac{x+3}{x-1} \quad \left. \right\} (1)$$

$$, \therefore n_2(x) = \frac{(x-5)(x+3)}{(x-5)(x-1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{5, 1\} \quad \left. \right\} (2)$$

$\therefore n_2(x) = \frac{x+3}{x-1}$

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_1 \neq$ the domain of n_2

[b] [1] $\because P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$\therefore P(A \cap B) = P(A) + P(B) - P(A \cup B) = \frac{1}{4} + \frac{1}{2} - \frac{5}{8} = \frac{1}{8}$$

[2] $P(B - A) = P(B) - P(A \cap B) = \frac{1}{2} - \frac{1}{8} = \frac{3}{8}$

[3] $P(A \cup B) = 1 - P(A \cap B) = 1 - \frac{5}{8} = \frac{3}{8}$

5

[a] $\because x - y = 3 \quad \therefore x = y + 3$

$$, y^2 - xy = 21 \quad (2)$$

substituting from (1) in (2) :

$$\therefore y^2 - (y+3)y = 21 \quad \therefore y^2 - y^2 - 3y = 21$$

$$\therefore -3y = 21 \quad \therefore y = -7$$

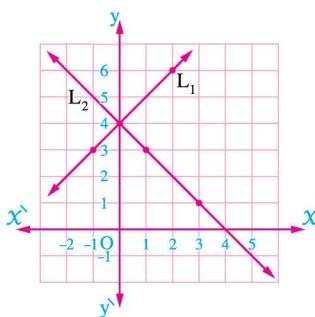
substituting in (1) : $\therefore x = -4$

$$\therefore \text{The S.S.} = \{(-4, -7)\}$$

[b] $y = x + 4 \quad , \quad x = 4 - y$

x	-1	0	2
y	3	4	6

x	3	1	0
y	1	3	4



From the graph : $\therefore \text{The S.S.} = \{(0, 4)\}$

Answers of model 2

1

[1] b

[4] c

[2] d

[5] c

[3] d

[6] d

2

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.6 + 0.5 - 0.3 = 0.8$
 $\therefore P(\bar{B}) = 1 - P(B) \quad \therefore P(\bar{B}) = 1 - 0.5 = 0.5$
[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)^2} \times \frac{2(x-1)}{x^2+x+1}$
 \therefore The domain of $n = \mathbb{R} - \{1\}$, $n(x) = 2$

3

[a] $\because 3x^2 - 6x + 1 = 0$
 $\therefore a = 3, b = -6, c = 1$
 $\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{6 \pm \sqrt{24}}{6}$
 $= \frac{6 \pm 2\sqrt{6}}{6} = \frac{3 \pm \sqrt{6}}{3}$
 $\therefore x \approx 1.82$ or $x \approx 0.18$
The S.S. = {1.82, 0.18}

[b] \because The domain of $n = \mathbb{R} - \{3\}$
 \therefore At $x = 3 \quad \therefore x^2 - ax + 9 = 0$
 $\therefore 9 - 3a + 9 = 0 \quad \therefore -3a = -18 \quad \therefore a = 6$

4

[a] $\because y - x = 2 \quad \therefore y = x + 2$
 $x^2 + xy - 4 = 0$

Substituting from (1) in (2) :

$$\begin{aligned} &\therefore x^2 + x(x+2) - 4 = 0 \\ &\therefore x^2 + x^2 + 2x - 4 = 0 \\ &\therefore 2x^2 + 2x - 4 = 0 \text{ (Dividing by 2)} \\ &\therefore x^2 + x - 2 = 0 \\ &(x-1)(x+2) = 0 \\ &\therefore x = 1 \quad \text{or} \quad x = -2 \end{aligned}$$

Substituting in (1) : $\therefore y = 3$ or $y = 0$
 \therefore The S.S. = {(1, 3), (-2, 0)}

[b] $\therefore n(x) = \frac{x-3}{(x-4)(x-3)} + \frac{x-3}{x-3}$
 \therefore The domain of $n = \mathbb{R} - \{4, 3\}$
 $, n(x) = \frac{1}{x-4} + 1 = \frac{1+x-4}{x-4} = \frac{x-3}{x-4}$

5

[a] Let the measure of the first angle be x°
, the measure of the second angle be y°
 $\therefore x + y = 90^\circ \quad (1)$
 $, x - y = 50^\circ \quad (2)$
Adding (1) and (2) : $\therefore 2x = 140^\circ \quad \therefore x = 70^\circ$
Substituting in (1) : $\therefore y = 20^\circ$
 \therefore The measures of the two angles are $70^\circ, 20^\circ$

[b] [1] $\therefore n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$
 $\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$
 \therefore The domain of $n^{-1} = \mathbb{R} - \{0, 2\}$
 $, n^{-1}(x) = \frac{x^2+2}{x}$
[2] $\therefore n^{-1}(x) = 3 \quad \therefore \frac{x^2+2}{x} = 3$
 $\therefore x^2 - 3x + 2 = 0 \quad \therefore (x-2)(x-1) = 0$
 $\therefore x = 2$ (refused) or $x = 1$

Answers of model 3

1

- | | | |
|-------|-------|-------|
| [1] d | [2] b | [3] b |
| [4] c | [5] b | [6] b |

2

[a] $P(\bar{A}) = 1 - P(A) = 1 - 0.7 = 0.3$
 $P(A - B) = P(A) - P(A \cap B)$
 $= 0.7 - 0.3 = 0.4$
 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.7 + 0.5 - 0.3 = 0.9$

[b] $\because z(f) = \{5\} \quad \therefore$ At $x = 5$
 $\therefore x^2 - 10x + a = 0 \quad \therefore (5)^2 - 10 \times 5 + a = 0$
 $\therefore 25 - 50 + a = 0 \quad \therefore a = 25$

3

[a] $\because x + y = 2 \quad (1)$
 $, \frac{1}{x} + \frac{1}{y} = 2 \quad \therefore x + y = 2xy \quad (2)$

Substituting in (1) from (2) : $\therefore 2 = 2xy$

$$\therefore xy = 1 \quad \therefore x = \frac{1}{y}$$

$$\text{Substituting in (1) : } \therefore \frac{1}{y} + y = 2$$

$$\text{Multiplying by } y : \therefore 1 + y^2 = 2y$$

$$\therefore y^2 - 2y + 1 = 0 \quad \therefore (y-1)^2 = 0$$

$$\therefore y = 1$$

$$\text{Substituting in (1) : } \therefore x = 1$$

$$\therefore \text{The S.S.} = \{(1, 1)\}$$

$$[\mathbf{b}] \because n_1(x) = \frac{x^2}{x^2(x-1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\} \quad \left. \begin{array}{l} \\ \end{array} \right\} (1)$$

$$\therefore n_1(x) = \frac{1}{x-1}$$

$$\therefore \begin{aligned} n_2(x) &= \frac{x(x^2+x+1)}{x(x^3-1)} \\ &= \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)} \end{aligned}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 1\} \quad \left. \begin{array}{l} \\ \end{array} \right\} (2)$$

$$\therefore n_2(x) = \frac{1}{x-1}$$

From (1) and (2) : $\therefore n_1 = n_2$

5

$$[\mathbf{a}] \because 2x^2 - 5x + 1 = 0$$

$$\therefore a = 2, b = -5, c = 1$$

$$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$$

$$\therefore \text{The S.S.} = \left\{ \frac{5 + \sqrt{17}}{4}, \frac{5 - \sqrt{17}}{4} \right\}$$

$$[\mathbf{b}] \because n(x) = \frac{x(x+2)}{(x+2)(x-2)} - \frac{2(x-3)}{(x-2)(x-3)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{-2, 2, 3\}$$

$$\therefore n(x) = \frac{x}{x-2} - \frac{2}{x-2} = \frac{x-2}{x-2} = 1$$

4

$$[\mathbf{a}] \because n(x) = \frac{x(x-3)}{(2x+3)(x-2)} \div \frac{x(2x-3)}{(2x-3)(2x+3)}$$

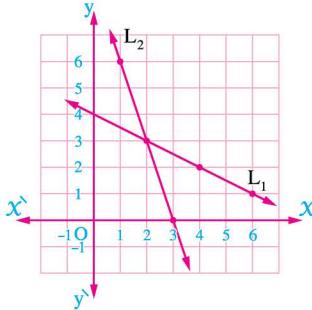
$$\therefore \text{The domain of } n = \mathbb{R} - \left\{ -\frac{3}{2}, 2, 0, \frac{3}{2} \right\}$$

$$\begin{aligned} n(x) &= \frac{x(x-3)}{(2x+3)(x-2)} \times \frac{(2x-3)(2x+3)}{x(2x-3)} \\ &= \frac{x-3}{x-2} \end{aligned}$$

$$[\mathbf{b}] x = 8 - 2y \quad , y = 9 - 3x$$

x	6	4	2
y	1	2	3

x	1	2	3
y	6	3	0



From the graph : $\therefore \text{The S.S.} = \{(2, 3)\}$

Model Examinations of the School Book



on Algebra and Probability

Model 1*Answer the following questions : (Calculator is allowed)***[1] Choose the correct answer from those given :****[1]** The domain of the function $n : n(x) = \frac{x}{x-1}$ is

- (a)
- $\mathbb{R} - \{0\}$
- (b)
- $\mathbb{R} - \{1\}$
- (c)
- $\mathbb{R} - \{0, 1\}$
- (d)
- $\mathbb{R} - \{-1\}$

[2] The number of solutions of the two equations : $x + y = 2$ and $y + x = 3$ together in $\mathbb{R} \times \mathbb{R}$ is

- (a) zero (b) 1 (c) 2 (d) 3

[3] If $x \neq 0$, then $\frac{5x}{x^2+1} \div \frac{x}{x^2+1} = \dots$

- (a) -5 (b) -1 (c) 1 (d) 5

[4] If the ratio between the perimeters of two squares is $1 : 2$, then the ratio between their areas is

- (a)
- $1 : 2$
- (b)
- $2 : 1$
- (c)
- $1 : 4$
- (d)
- $4 : 1$

[5] The equation of the symmetric axis of the curve of the function f where $f(x) = x^2 - 4$ is

- (a)
- $x = -4$
- (b)
- $x = 0$
- (c)
- $y = 0$
- (d)
- $y = -4$

[6] If $A \subset S$ of random experiment and $P(\bar{A}) = 2P(A)$, then $P(A) = \dots$

- (a)
- $\frac{1}{3}$
- (b)
- $\frac{1}{2}$
- (c)
- $\frac{2}{3}$
- (d) 1

[2] [a] By using the general formula , find in \mathbb{R} the solution set of the equation : $2x^2 - 5x + 1 = 0$ "approximate the result to the nearest one decimal".**[b] Find $n(x)$ in the simplest form showing the domain where :**

$$n(x) = \frac{x-3}{x^2-7x+12} - \frac{4}{x^2-4x}$$

[3] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - y = 0 \text{ and } x^2 + xy + y^2 = 27$$

[b] Find $n(x)$ in the simplest form showing the domain where :

$$n(x) = \frac{x^2 + 4x + 3}{x^3 - 27} \div \frac{x+3}{x^2 + 3x + 9} \text{ then find } n(2), n(-3) \text{ if possible.}$$

Algebra and Probability

- 4 [a] A rectangle with a length more than its width by 4 cm. If the perimeter of the rectangle is 28 cm., find the area of the rectangle.

[b] If $n(x) = \frac{x^2 - 2x}{x^2 - 3x + 2}$,

1 Find $n^{-1}(x)$ in the simplest form showing the domain of n^{-1}

2 If $n^{-1}(x) = 3$, then find the value of x

- 5 [a] If $n_1(x) = \frac{x^2}{x^3 - x^2}$ and $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, then prove that: $n_1 = n_2$

[b] In the opposite figure :

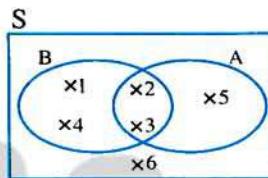
If A and B are two events in a sample space S

of a random experiment, then find :

1 $P(A \cap B)$

2 $P(A - B)$

3 The probability of non-occurrence of the event A



Model 2

Answer the following questions :

- 1 Choose the correct answer :

1 The solution set of the two equations : $x = 3$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is

- (a) $\{(3, 4)\}$ (b) $\{(4, 3)\}$ (c) \mathbb{R} (d) \emptyset

2 The set of zeroes of the function f where $f(x) = x^2 + 4$ in \mathbb{R} is

- (a) $\{2\}$ (b) $\{2, -2\}$ (c) \mathbb{R} (d) \emptyset

3 If A and B are two mutually exclusive events of a random experiment, then $P(A \cap B) =$

- (a) 0 (b) 1 (c) 0.5 (d) \emptyset

4 The domain of the multiplicative inverse of the function f : $f(x) = \frac{x+2}{x-3}$ is

- (a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-2, 3\}$ (c) $\mathbb{R} - \{-3\}$ (d) \mathbb{R}

5 The two straight lines : $3x + 5y = 0$, $5x - 3y = 0$ are intersect in

- (a) first quadrant. (b) second quadrant. (c) the origin point. (d) fourth quadrant.

6 If $P(A) = 0.6$, then $P(\bar{A}) =$

- (a) 0.4 (b) 0.6 (c) 0.5 (d) 1

[2] [a] Find in \mathbb{R} the solution set of the equation : $3x^2 - 5x + 1 = 0$

by using the formula “approximate the result to the nearest two decimal places”.

[b] Simplify :

$$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x+3}{x^2 + 2x + 4}, \text{ showing the domain of } n.$$

[3] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 1$, $x^2 + y^2 = 25$

[b] If A and B are two events of a random experiment and

$$P(A) = 0.3 , P(B) = 0.6 , P(A \cap B) = 0.2$$

Find : **1** $P(A \cup B)$

2 $P(A - B)$

[4] [a] Solve the following two equations in $\mathbb{R} \times \mathbb{R}$: $2x - y = 3$, $x + 2y = 4$

[b] Simplify :

$$n(x) = \frac{x^2 + 3x}{x^2 - 9} \div \frac{2x}{x+3}, \text{ showing the domain of } n.$$

[5] [a] Simplify :

$$n(x) = \frac{x^2 + 2x}{x^2 - 4} + \frac{x+3}{x^2 - 5x + 6}, \text{ showing the domain of } n.$$

[b] Graph the function f where $f(x) = x^2 - 1$, $x \in [-3, 3]$, from the graph
find in \mathbb{R} the solution set of the equation : $x^2 - 1 = 0$

هذا العمل خاص بموقع ذاكرولي التعليمي ولا يسمح بتناوله على مواقع أخرى



Governorates' Examinations



on Algebra and Probability

1

Cairo Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

- 1** If the two equations $X + 3 y = 6$, $2 X + m y = 12$ have an infinite number of solutions , then $m = \dots$

- 2** If $2^{k-3} = 1$, then $k = \dots$

(a) -3 (b) zero (c) 3 (d) 8

- 3 The set of zeroes of the function $f : f(X) = \text{zero}$ is

- (a) $\mathbb{R} - \{0\}$ (b) \emptyset (c) $\{0\}$ (d) \mathbb{R}

- 4** If $x^2 + ax - 4 = (x+2)(x-2)$, then $a = \dots$

- (a) -2 (b) zero (c) 2 (d) 4

- 5 If the two events A , B are mutually exclusive events from the sample space of a random experiment , then $P(A \cap B) = \dots$

- 6** If $|x| = 7$, then $x = \dots$

(a) 7 (b) -7 (c) ± 7 (d) 14

- 2** [a] Two real numbers their sum is 40 , and the difference between them is 10 , find the two numbers.

[b] Find $n(x)$ in the simplest form , showing the domain where : $n(x) = \frac{x}{x-2} - \frac{2x+4}{x^2-4}$

- 3** [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations together :

$$x - 3 = 0 \quad , \quad x^2 + y^2 = 25$$

- [b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^2 + x + 1}{x^3 - 1}$

, prove that : $n_1(x) = n_2(x)$ for all the values of x which belong to the common domain and find this domain.

- 4** [a] Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}$$

Final Examinations

[b] Find algebraically in \mathbb{R} the solution set of the equation : $2x^2 + 5x - 6 = 0$, approximating the results to the nearest one decimal place.

- 5 [a] If A , B are two events of the sample space of a random experiment and

$$P(A) = 0.7 , P(B) = 0.5 , P(A \cap B) = 0.3$$

, find : 1 $P(A \cup B)$

2 $P(A - B)$

[b] If $n(x) = \frac{x}{x+3}$

1 Find $n^{-1}(x)$, showing the domain of n^{-1}

2 If $n^{-1}(x) = 4$, find the value of x

2

Giza Governorate



Answer the following questions :

- 1 Choose the correct answer from the given ones :

1 If the perimeter of a square is 16 cm. , then its area = cm^2

- (a) 4 (b) 8 (c) 16 (d) 64

2 The domain of the function $n : n(x) = \frac{x}{x^2 - 1}$ is

- (a) $\{-1\}$ (b) $\mathbb{R} - \{1\}$ (c) $\{1, -1\}$ (d) $\mathbb{R} - \{1, -1\}$

3 If $\frac{1}{3}x = 2$, then $\frac{1}{2}x =$

- (a) 2 (b) 3 (c) 6 (d) 8

4 The number of solutions of the two equations $x + y = 1$, $x + y = 2$ together in $\mathbb{R} \times \mathbb{R}$ is

- (a) zero (b) 1 (c) 2 (d) 3

5 If $x^2 + kx + 81$ is a perfect square , then $k =$

- (a) ± 6 (b) ± 9 (c) ± 18 (d) ± 81

6 If $A \subset S$ of a random experiment , $P(A) + P(\bar{A}) = 2k$, then $k =$

- (a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

- 2 [a] By using the formula find in \mathbb{R} the solution set of the equation :

$$2x^2 - 5x + 1 = 0 \text{ rounding the results to two decimal places.}$$

- [b] Find $n(x)$ in its simplest form where :

$$n(x) = \frac{x^2 - 4}{x^3 - 8} \div \frac{x^2 - x - 6}{x^2 + 2x + 4} , \text{ showing the domain.}$$

Algebra and Probability

- 3** [a] A right-angled triangle of hypotenuse length 10 cm. and its perimeter is 24 cm.
Find the lengths of the other two sides.

- [b] If A, B are two mutually exclusive events of a random experiment
 $, P(A) = 0.2 , P(B) = 0.5$, find : $P(A \cup B)$ and $P(A - B)$

- 4** [a] If $n(X) = \frac{x^2 - 3x}{x^2 - 5x + 6}$
, find : 1 $n^{-1}(X)$ in the simplest form , showing the domain of n^{-1}
2 The value of X if $n^{-1}(X) = 2$

- [b] Find the solution set for the following equations algebraically in $\mathbb{R} \times \mathbb{R}$:

$$x + 2y = 4 , 3x - y = 5$$

- 5** [a] If $n(X) = \frac{x^2}{x-1} + \frac{x}{1-x}$, then find $n(X)$ in the simplest form , showing the domain.
[b] If $n_1(X) = \frac{x^2 + x - 6}{x^2 - 4}$, $n_2(X) = \frac{x^2 - 9}{x^2 - x - 6}$, then show whether $n_1 = n_2$ or not and why.

3 Alexandria Governorate



Answer the following questions : (Calculators are allowed)

- 1** Choose the correct answer from those given :

- 1 The set of zeroes of the function f where $f(X) = X + 4$ in \mathbb{R} is
 (a) $\{4, -4\}$ (b) $\{-4\}$ (c) \mathbb{R} (d) \emptyset
- 2 If $X^3 y^{-3} = 8$, then $\frac{y}{X} =$
 (a) $\frac{1}{512}$ (b) $\frac{1}{8}$ (c) 2 (d) $\frac{1}{2}$
- 3 The equation of the symmetric axis of the curve of the function f
where $f(X) = X^2 - 4$ is
 (a) $X = -4$ (b) $X = \text{zero}$ (c) $y = \text{zero}$ (d) $y = -4$
- 4 The solution set of the equation : $X^2 = 9$ in \mathbb{Q} is
 (a) $\{-3\}$ (b) $\{3\}$ (c) \emptyset (d) $\{-3, 3\}$
- 5 If $A \subset S$ of a random experiment and $P(\bar{A}) = 2P(A)$, then $P(A) =$
 (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1
- 6 $\frac{5^{X+2}}{5^{X+1}} =$
 (a) 5 (b) 10 (c) 15 (d) 20

- 2 [a]** Find the solution set of the two equations :

$$x - y = 0 \text{ and } x^2 + xy + y^2 = 27 \text{ in } \mathbb{R} \times \mathbb{R}$$

- [b]** Find the common domain for which $n_1(x)$ and $n_2(x)$ are equal , where :

$$n_1(x) = \frac{x^2 + x - 12}{x^2 + 5x + 4}, \quad n_2(x) = \frac{x^2 - 2x - 3}{x^2 + 2x + 1}$$

- 3 [a]** By using the general formula , find in \mathbb{R} the solution set of the equation :

$$2x^2 + 5x = 0$$

- [b]** Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{x^3 - 1}{x^2 - x} \times \frac{x + 3}{x^2 + x + 1}$$

- 4 [a]** Find algebraically the solution set of the two equations :

$$2x + y = 1, \quad x + 2y = 5 \text{ in } \mathbb{R} \times \mathbb{R}$$

- [b]** Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{x^2 - x}{x^2 - 1} + \frac{x + 5}{x^2 + 6x + 5}$$

- 5 [a]** If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 + 2)}$

1 Find $n^{-1}(x)$ in the simplest form , showing the domain on n^{-1}

2 If $n^{-1}(x) = 3$, then find the value of x

- [b]** If A and B are two mutually exclusive events of a random experiment and

$$P(A) = \frac{1}{3}, \quad P(A \cup B) = \frac{7}{12}, \text{ find : } P(B)$$

4 El-Kalyoubia Governorate



Answer the following questions :

- 1** Choose the correct answer :

1 If $x^2 + kx - 21 = (x - 3)(x + 7)$, then $k = \dots$

- (a) -2 (b) 4 (c) 8 (d) 20

2 One of the solutions for the two equations : $x - y = 2$, $x^2 + y^2 = 20$ in $\mathbb{R} \times \mathbb{R}$ is

- (a) (-4, 2) (b) (2, -4) (c) (3, 1) (d) (4, 2)

3 If $5^{x-3} = 1$, then $2x^2 = \dots$

- (a) 36 (b) 9 (c) 18 (d) 3

Algebra and Probability

- 4** If $A \cap B = \emptyset$, then $P(A - B) = \dots$
- (a) $P(A)$ (b) $P(B)$ (c) $P(B - A)$ (d) 1
- 5** If the width of the rectangle is 3 cm., and its diagonal length is 5 cm., then its length is cm.
- (a) 2 (b) $\frac{5}{3}$ (c) 4 (d) $\frac{3}{5}$
- 6** If $\frac{1}{x} + \frac{1}{y} + \frac{1}{xy} = \frac{k}{xy}$, then $k = \dots$
- (a) 2 (b) 3 (c) $x + y + 1$ (d) $x + y$
-
- 2** [a] If A and B are two events from the sample space of a random experiment and $P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$
, find : 1 $P(A \cup B)$ 2 The probability of non-occurrence of the event A
- [b] A rectangle with a length more than its width by 4 cm. If the perimeter of the rectangle is 28 cm., find the area of the rectangle.
-
- 3** [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 0$, $x^2 + xy + y^2 = 27$
- [b] Find $n(x)$ in the simplest form, showing the domain : $n(x) = \frac{x^2 + 2x}{x^3 - 27} \div \frac{x+2}{x^2 + 3x + 9}$
-
- 4** [a] Find in \mathbb{R} the solution set of the equation : $2x^2 - 4x + 1 = 0$
approximating the results to one decimal place. (using the general rule)
- [b] If $n_1(x) = \frac{2x}{2x+4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, prove that : $n_1 = n_2$
-
- 5** [a] Find $n(x)$ in the simplest form, showing the domain :
- $$n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} + \frac{x^2 - 9}{x^2 + x - 6}$$
- [b] If the domain of the function f where $f(x) = \frac{x}{x^2 - 5x + m}$ is $\mathbb{R} - \{2, k\}$, then find the value of each of m and k

5

El-Sharkia Governorate



Answer the following questions : (Calculators are allowed)

- 1** Choose the correct answer from the given ones :

- 1 If the domain of the fractional function $n(x)$ is $\mathbb{R} - \{2, 3, 4\}$, then $n(3) = \dots$
- (a) 3 (b) 2 (c) 4 (d) not exist
- 2 If $x^2 + y^2 = 5$, $xy = 2$ where $x \in \mathbb{R}$, $y \in \mathbb{R}$, then $(x+y)^2 = \dots$
- (a) 7 (b) 9 (c) 5 (d) 13

3 The point $(2, -1)$ does not belong to the straight line whose equation is

- (a) $X + y = 1$ (b) $X - y = 3$ (c) $X = 2$ (d) $y = 5$

4 If $n(X) = \frac{X}{X-1}$, then the domain of n^{-1} is

- (a) $\mathbb{R} - \{1, 0\}$ (b) $\mathbb{R} - \{0\}$ (c) $\mathbb{R} - \{1\}$ (d) $\{1, 0\}$

5 The two straight lines $L_1 : 3X + 7Y = 0$ and $L_2 : 5X + 9Y = 0$ are intersecting in the

- (a) third quadrant. (b) fourth quadrant. (c) first quadrant. (d) origin point.

6 If A, B are two events from the sample space of a random experiment and $A \subset B$, which of the following expressions is false ?

- | | |
|------------------------------|--------------------------|
| (a) $P(A \cup B) = P(B)$ | (b) $P(A \cap B) = P(A)$ |
| (c) $P(A - B) = \text{zero}$ | (d) $P(A - B) = P(B)$ |

2 [a] By using the general formula , find in \mathbb{R} the solution set of the equation : $X(X-2) = 1$

[b] If $n(X) = \frac{X^3 + X}{X^2 + 1} + \frac{X^2 + 2X + 4}{X^3 - 8}$, find $n(X)$ in the simplest form , showing the domain.

3 [a] Find the solution set in $\mathbb{R} \times \mathbb{R}$ of the two equations : $2X - Y = 3$, $X + 2Y = 4$

[b] If $n(X) = \frac{X^2 - 2X - 15}{X^2 - 9} \div \frac{10 - 2X}{X^2 - 6X + 9}$

, find $n(X)$ in the simplest form , showing the domain.

4 [a] Find the solution set of the following two equations in $\mathbb{R} \times \mathbb{R}$:

$$X + 2Y = 2 \quad , \quad X^2 + 2XY = 2$$

[b] If $n_1(X) = 1 - \frac{1}{X}$, $n_2(X) = \frac{1-X}{X}$, show whether $n_1 = n_2$ or not.

5 [a] In a random experiment , a regular dice is rolled once and observing the upper face.

If : A : The event of getting an even number.

B : The event of getting a prime number.

, find : $P(A)$, $P(B)$, $P(A \cup B)$

[b] If $n(X) = \frac{k}{X} + \frac{9}{X+m}$ where the domain of n is $\mathbb{R} - \{0, 4\}$, and $n(5) = 2$

, find the value of each of : m , k

Algebra and Probability

6 El-Monofia Governorate



Answer the following questions : (Using calculator is permitted)

1 Choose the correct answer from those given :

[1] $4^{15} + 4^{15} = \dots$

(a) 4^{30}

(b) 4^{zero}

(c) 8^{15}

(d) 2^{31}

[2] The necessary numbers to complete the pattern :

$\frac{1}{5}, 0.4, \frac{3}{5}, \dots, \dots, \dots, \frac{7}{5}$ is

(a) $0.8, \frac{6}{5}, 1.2$

(b) $0.8, 1, 1.2$

(c) $0.6, 0.8, 1$

(d) $0.8, 1, 4.1$

[3] The multiplicative inverse of the number $1 - \sqrt{2}$ is

(a) $1 + \sqrt{2}$

(b) $\sqrt{2} - 1$

(c) $-(1 + \sqrt{2})$

(d) $\frac{1 + \sqrt{2}}{2}$

[4] The domain of the function $n^{-1}(x) = \frac{x+4}{x-4}$ is

(a) \mathbb{R}

(b) $\mathbb{R} - \{4\}$

(c) $\mathbb{R} - \{-4\}$

(d) $\mathbb{R} - \{4, -4\}$

[5] The two straight lines : $3x - 5y = 0$, $5x + 3y = 0$ intersect at the

(a) 1st quadrant.

(b) 3rd quadrant.

(c) origin point.

(d) 4th quadrant.

[6] If $P(A) = 3P(\bar{A})$, then $P(A) = \dots$

(a) $\frac{3}{4}$

(b) 1

(c) $\frac{1}{3}$

(d) $\frac{1}{4}$

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$2x - y = 3$, $x + 2y = 4$

[b] Find in \mathbb{R} by using the general formula the solution set of the equation :

$3x^2 = 5x - 1$ rounding the result to the nearest two decimal digits.

3 [a] If the set of zeroes of the function $f : f(x) = \frac{x^2 - ax + 9}{bx + 4}$ is $\{3\}$ and its domain is $\mathbb{R} - \{-2\}$, find the value of each of a and b

[b] If $n(x) = \frac{x^3 - 8}{x^2 - 3x + 2} \div \frac{x^3 + 2x^2 + 4x}{2x^2 + x - 3}$, find $n(x)$ in the simplest form, showing the domain.

4 [a] If $n(x) = \frac{x-3}{x^2 - 7x + 12} - \frac{4}{x^2 - 4x}$, find $n(x)$ in the simplest form, showing the domain, then find $n(4)$ if it is possible.

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x + y = 4$, $\frac{1}{x} + \frac{1}{y} = 1$, where $x \neq 0, y \neq 0$

[5] [a] If $n_1(x) = \frac{x^2 + 5x + 6}{x^2 + x - 2}$ and $n_2(x) = \frac{x^2 - 2x - 15}{x^2 - 6x + 5}$, is $n_1 = n_2$? and why?

[b] If A and B are two events of the sample space of a random experiment, and

$P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{5}{8}$, find each of the following:

1 $P(A \cap B)$

2 $P(B - A)$

3 $P(A \cup B)$

7

El-Gharbia Governorate



Answer the following questions :

[1] Choose the correct answer :

1 If $2^{x+1} = 1$, then $x \in \dots$

(a) {0}

(b) {0, -1}

(c) {-1}

(d) $\mathbb{R} - \{-1\}$

2 The number of solutions of the equation $x - y = 0$ in $\mathbb{R} \times \mathbb{R}$ is

(a) 1

(b) 2

(c) 3

(d) infinite

3 In the experiment of tossing a piece of coin once, if A is the event of appearance of a head, B is the event of appearance of a tail, then $P(A \cup B) = \dots$

(a) $\frac{1}{2}$

(b) 1

(c) zero

(d) \emptyset

4 The set of zeroes of $f : f(x) = \frac{-3}{x-2}$ is

(a) $\mathbb{R} - \{2\}$

(b) $\mathbb{R} - \{3\}$

(c) {2}

(d) \emptyset

5 If the curve of the quadratic function f passes through the points $(-1, 0), (0, -4), (4, 0)$, then the solution set of the equation $f(x) = 0$ in \mathbb{R} is

(a) {-1, 0}

(b) {-4, 0}

(c) {-1, 4}

(d) {4, -4}

6 If $\sqrt{x^2} = 25$, then $x = \dots$

(a) 5

(b) ± 5

(c) 25

(d) ± 25

[2] [a] If A and B are two events in the sample space of a random experiment and $P(A) = 0.5$, $P(A \cup B) = 0.8$, $P(B) = x$, $P(A \cap B) = 0.1$

Find the value of : x and $P(A - B)$

[b] If $n(x) = x + \frac{x}{x-2}$, find $n^{-1}(x)$ in the simplest form, showing the domain of n^{-1}

[3] [a] Find $n(x)$ in the simplest form, showing the domain of n where :

$$n(x) = \frac{x}{x-2} - \frac{x}{x+2}$$

[b] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$$x - y = 3, \quad y^2 - xy = 21$$

Algebra and Probability

- 4** [a] By using the general rule and without using the calculator , find in \mathbb{R} the solution set of the equation : $x^2 + 2x - 4 = 0$ in the simplest form.

[b] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^2 - x - 6}{x^2 - 9}$, is $n_1 = n_2$? With the reason.

- 5** [a] Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^3 - 1}{x^2 - x} \div \frac{x^2 + x + 1}{x + 3}$$

- [b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically or graphically : $y = x + 4$, $x + y = 4$

8

El-Dakahlia Governorate



Answer the following questions : (Calculator is permitted)

- 1** [a] Choose the correct answer from the given ones :

[1] The solution set of the two equations $x - 3 = 0$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is

- (a) {3 , 4} (b) {(3 , 4)} (c) {(4 , 3)} (d) \emptyset

[2] If A , B are two events in a random experiment , $A \subset B$, then $P(A \cup B) =$

- (a) $P(B)$ (b) $P(A)$ (c) $P(A \cap B)$ (d) 0

[3] If $3^y \times 5^y = 225$, then $y =$

- (a) 2 (b) 15 (c) 0 (d) 20

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the equations : $3x - y = 5$ and $x + 2y = 4$

- 2** [a] Choose the correct answer from the given ones :

[1] The domain of the additive inverse of the function $n : n(x) = \frac{x+2}{x-3}$ is

- (a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-2\}$ (c) $\mathbb{R} - \{-2, 3\}$ (d) \mathbb{R}

[2] The set of zeroes of the function $f : f(x) = x^2 + 9$ in \mathbb{R} is

- (a) \mathbb{R} (b) {3} (c) {3 , -3} (d) \emptyset

[3] The curve $y = ax^2 + bx + c$ cuts y-axis at the point

- (a) (0 , b) (b) (b , 0) (c) (c , 0) (d) (0 , c)

[b] Find $n(x)$ in the simplest form , showing the domain : $n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{5 - x}{x^2 - 6x + 5}$

- 3** [a] If A , B are two events in a random experiment and $P(A) = 0.6$, $P(B) = 0.5$,

$P(A \cap B) = 0.3$, find : $P(A \cup B)$, $P(\bar{B})$

[b] Simplify to the simplest form , showing the domain :

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

- 4** [a] If $n_1(x) = \frac{x^2 - x}{x^3 - 2x^2}$, $n_2(x) = \frac{x^2 - 3x + 2}{x^3 - 4x^2 + 4x}$, prove that: $n_1 = n_2$

[b] By using the general rule , find the solution set of the equation :

$2x^2 - 4x + 1 = 0$ in \mathbb{R} , rounding the results to two decimal places.

- 5** [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 0$ and $x = \frac{4}{y}$ algebraically.

[b] If $n(x) = \frac{x^2 - 2x}{(x-2)(x^2 + 2)}$

- 1** Find : $n^{-1}(x)$ and identify the domain of n^{-1}

2 If $n^{-1}(x) = 3$, what is the value of x ?



9

Ismailia Governorate

Answer the following questions : (Calculators are allowed)

1 Choose the correct answer from those given :

- 1 If x is the additive identity element, y is the multiplicative identity element, then $2^x + 3^y = \dots$

- 2** The set of zeroes of the function $f : f(x) = 2x - 6$ is
(a) {1} (b) {3} (c) {5} (d) {7}

- 3 If $\sqrt{x} = 2$, then $\frac{1}{2}x = \dots$
(a) 8 (b) 6 (c) 4 (d) 2

- 4 The number of solutions of the two equations : $2x - y = 3$, $x + 2y = 4$ in $\mathbb{R} \times \mathbb{R}$ is

- 5 If A , B are two mutually exclusive events of a random experiment , then $P(A \cap B) = \dots$

- (a) \emptyset (b) 1 (c) zero (d) 0.5

- 6 If $x - y = 3$ and $x + y = 5$, then $x^2 - y^2 + 2 = \dots$
(a) 15 (b) 16 (c) 17 (d) 18

[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations together:

$$2x + y = 1 \quad , \quad x + 2y = 5$$

- [b]** If $n_1(x) = \frac{x^2 - 3x + 9}{x^3 + 27}$, $n_2(x) = \frac{2}{2x + 6}$, prove that : $n_1 = n_2$

Algebra and Probability

- 3 [a] By using the general formula , find in \mathbb{R} the solution set of the equation :

$3x^2 - 6x = -1$ (approximating the result to the nearest two decimals)

- [b] If the domain of the function n is $\mathbb{R} - \{3\}$ where $n(x) = \frac{x-1}{x^2 - ax + 9}$, find the value of a

- 4 [a] Two numbers , their product is 10 and the difference between them is 3
Find the two numbers.

- [b] Find $n(x)$ in the simplest form , showing the domain of n where :

$n(x) = \frac{x^2 + 4x - 5}{x^3 - 8} \div \frac{x+5}{x^2 + 2x + 4}$, then find : $n(3)$, $n(2)$ if it is possible.

- 5 [a] Find $n(x)$ in the simplest form , showing the domain of n where :

$n(x) = \frac{x^2 - 3x}{x^2 - 9} + \frac{x-1}{x^2 + 2x - 3}$

- [b] If A and B are two events in the sample space of a random experiment and $P(A) = 0.4$, $P(B) = 0.5$ and $P(A \cap B) = 0.2$
, find : 1 P(A ∪ B) 2 P(A - B)

10

Suez Governorate



Answer the following questions : (Calculators are allowed)

- 1 Choose the correct answer from the given ones :

- 1 The set of zeroes of f where $f(x) = x - 5$ is
 (a) \mathbb{R} (b) $\{-5\}$ (c) $\{5\}$ (d) \emptyset
- 2 If $A \subset S$ of a random experiment , $P(\bar{A}) = P(A)$, then $P(A) =$
 (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1
- 3 The solution set in $\mathbb{R} \times \mathbb{R}$ of the two equations : $x = 3$, $y = 4$ is
 (a) $\{(3, 4)\}$ (b) $\{(4, 3)\}$ (c) \mathbb{R} (d) \emptyset
- 4 If the ratio between the perimeters of two squares is $1 : 2$, then the ratio between their areas is
 (a) $1 : 2$ (b) $2 : 1$ (c) $1 : 4$ (d) $4 : 1$
- 5 If $n(x) = \frac{x-1}{x+1}$, then the domain of n^{-1} =
 (a) $\{-1\}$ (b) $\mathbb{R} - \{-1, 1\}$ (c) $\mathbb{R} - \{-1\}$ (d) \mathbb{R}
- 6 If $a - b = -3$, then $(a - b)^2 =$
 (a) -9 (b) 12 (c) 9 (d) 18

- 2 [a]** Find the solution set in $\mathbb{R} \times \mathbb{R}$ of the equations : $x - y = 3$, $2x + y = 9$

(Explain your answer , showing the steps of the solution)

- [b]** Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 - 2x}{x^2 - 4} + \frac{2x + 6}{x^2 + 5x + 6}$$

- 3 [a]** Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations : $x - y = 0$, $xy = 9$

- [b]** Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 + 2x - 3}{x + 3} \times \frac{x + 1}{x^2 - 1}$$

- 4 [a]** A and B are two events from the sample space of a random experiment and

$$P(A) = 0.3 , P(B) = 0.6 , P(A \cap B) = 0.2$$

Find : **1** $P(A \cup B)$ **2** $P(\bar{A})$

- [b]** Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 - 2x + 1}{x^3 - 1} \div \frac{x - 1}{x^2 + x + 1}$$

- 5 [a]** Find the solution set for the following equation by using the formula in \mathbb{R} :

$$x^2 - 2x - 6 = 0 \text{ (Rounding the results to two decimal places)}$$

[b] If $n_1(x) = \frac{2x}{2x+4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, prove that : $n_1 = n_2$

11

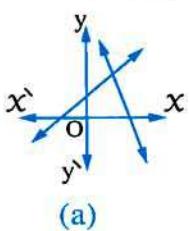
Port Said Governorate



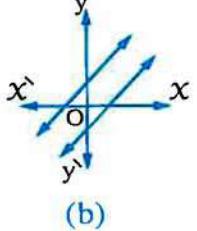
Answer the following questions :

- 1** Choose the correct answer from those given :

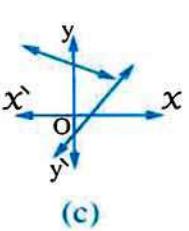
- 1** Which of the following graphs represents two equations of the first degree in two variables which have no common solution ?



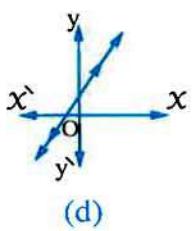
(a)



(b)



(c)



(d)

- 2** The set of zeroes of the function $f : f(x) = x^2 + x + 1$ is

(a) $\{1\}$

(b) $\{-1\}$

(c) \emptyset

(d) $\{-1, 1\}$

Algebra and Probability

- 3** If the ratio between the perimeters of two squares is $3 : 4$, then the ratio between their areas is
 (a) $3 : 4$ (b) $9 : 16$ (c) $16 : 9$ (d) $4 : 3$
- 4** If $A \subset S$ of a random experiment , $P(\bar{A}) = 2 P(A)$, then $P(A) =$
 (a) 1 (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$
- 5** If $n(x) = \frac{x-2}{x+5}$, then the domain of the function n^{-1} is
 (a) \mathbb{R} (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{5\}$ (d) $\mathbb{R} - \{2, -5\}$
- 6** If a fair die is rolled once , then the probability of getting an even number and a prime number together equals
 (a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) zero (d) 1

2 [a] If the domain of the function $n : n(x) = \frac{x-1}{x^2 - ax + 9}$ is $\mathbb{R} - \{3\}$, then find the value of a

[b] A rectangle is of perimeter 22 cm. and area 24 cm^2 . Find its two dimensions.

3 [a] Find in \mathbb{R} by using the general formula the solution set of the equation : $x^2 - 2x - 1 = 0$ approximating the results to the nearest one decimal digit.

[b] Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{x^2 + x + 1}{x} \div \frac{x^3 - 1}{x^2 - x}$$

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x + 3y = 7$, $5x - y = 3$

[b] Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{x^2 + 2x}{x^2 - 4} + \frac{x - 3}{x^2 - 5x + 6}$$

5 [a] A set of cards numbered from 1 to 20 and well mixed. If a card is drawn randomly , find the probability that the drawn card is carrying :

- 1** A number multiple of 4 **2** A number multiple of 5
3 A number multiple of 4 or 5

[b] If $n_1(x) = \frac{x+3}{x^2 - 9}$, $n_2(x) = \frac{2}{2x - 6}$

, prove that : $n_1(x) = n_2(x)$ for the value of x which belong to the common domain and find the domain.

12

Damietta Governorate

**Answer the following questions : (Calculators are allowed)****1 Choose the correct answer from the given ones :**

- [1]** If there are an infinite number of solutions of the two equations : $x + 4y = 7$, $x + (k - 1)y = 7$ in $\mathbb{R} \times \mathbb{R}$, then $k = \dots$
- (a) 5 (b) 7 (c) 12 (d) 13
- [2]** If $B \subset A$, then $P(A \cup B) = \dots$
- (a) 1 (b) $P(A)$ (c) $P(B)$ (d) $2P(B)$
- [3]** If $x = 2$, $y = 3$, then $(y - 2x)^{10} = \dots$
- (a) -1 (b) zero (c) 5 (d) 1
- [4]** If $ab = 3$, $ab^2 = 12$, then $b = \dots$
- (a) 4 (b) 2 (c) -2 (d) ± 2
- [5]** If 3 is one of zeroes of the function f where $f(x) = x^2 - 3x + c$, then $c = \dots$
- (a) 6 (b) 0 (c) -6 (d) 3
- [6]** If a , b , c are three rational numbers where $a < b$ and c is a negative number , then $ac \dots bc$
- (a) $>$ (b) $=$ (c) \leq (d) $<$

- [2]** [a] By using the general formula , find in \mathbb{R} the solution set of the equation : $x + \frac{4}{x} = 6$, rounding the results to one decimal digit.

[b] Simplify : $n(x) = \frac{2x}{x-3} \div \frac{x^2+2x}{x^2-9}$, showing the domain.

- [3]** [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :

$$x + 2y = 4 \quad , \quad 2x - y = 3$$

[b] Simplify : $n(x) = \frac{x^2 - 2x + 4}{x^3 + 8} + \frac{x^2 - 1}{x^2 + x - 2}$, showing the domain.

- [4]** [a] If $n_1(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, $n_2(x) = \frac{2x}{2x + 4}$,

then prove that : $n_1 = n_2$

- [b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 2$, $x^2 + y^2 = 20$

- [5]** [a] If the domain of the function $n : n(x) = \frac{x+1}{x^2 - ax + 25}$ is $\mathbb{R} - \{5\}$, then find the value of a

Algebra and Probability

[b] If A and B are two events from the sample space of a random experiment ,

$$P(A) = 0.8 , P(B) = 0.7 , P(A \cap B) = 0.6$$

, find : 1 $P(A \cup B)$

2 The probability of non-occurrence of the event A

13 Kafr El-Sheikh Governorate



Answer the following questions : (Calculator is allowed)

1 [a] Choose the correct answer :

1 If there is only one solution for the two equations $X + 4y = 5$ and $3X + ky = 15$, then k can't equal

- (a) -4 (b) 4 (c) 12 (d) -12

2 If $\sqrt{100 - 36} = 10 - a$, then a =

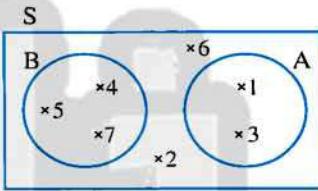
- (a) 2 (b) 6 (c) 4 (d) 3

3 In the opposite figure :

If A and B are two events in the sample space S of a random experiment ,

then $P(B - A) =$

- (a) $\frac{1}{2}$ (b) $\frac{5}{7}$ (c) $\frac{2}{7}$ (d) $\frac{3}{7}$



[b] Find $n(X)$ in the simplest form , showing the domain of n where :

$$n(X) = \frac{2X^2 - X - 6}{X^2 - 3X} \div \frac{4X^2 - 9}{2X^2 - 3X}$$

2 [a] Choose the correct answer :

1 If the domain of the function $n : n(X) = \frac{x+2}{4X^2+kX+9}$ is $\mathbb{R} - \left\{ \frac{-3}{2} \right\}$, then the value of k =

- (a) 15 (b) -15 (c) 12 (d) -12

2 If $6^x = 12$, then $6^{x+1} =$

- (a) 66 (b) 13 (c) 27 (d) 72

3 The S.S. of the inequality : $-X < 3$ in \mathbb{R} is

- (a) $[3, \infty[$ (b) $]3, \infty[$ (c) $]-3, \infty[$ (d) $[-3, \infty[$

[b] If $n_1(X) = \frac{X}{X^2 - X}$, $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$, prove that : $n_1 = n_2$

3 [a] Find in \mathbb{R} the solution set of the equation : $3X^2 + 1 = 5X$, rounding the results to two decimal places.

Final Examinations

[b] If $n_1(x) = \frac{x^2 - 2x - 15}{x^2 - 9}$, $n_2(x) = \frac{6 - ax}{x^2 - 6x + 9}$, where the set of zeroes of n_2 is $\{-3\}$

1 Find the value of a

2 Find $n(x)$ where $n(x) = n_1(x) - n_2(x)$ in the simplest form, showing the domain of n

4 [a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$$3x + 2y = 4, \quad x - 3y = 5$$

[b] If A and B are two events from the sample space S of a random experiment

, $P(A) = \frac{1}{2}$, $2P(B) = P(\bar{B})$, then find $P(A \cup B)$ in each of the following cases :

1 $P(A \cap B) = \frac{1}{6}$ 2 A, B are mutually exclusive events.

5 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$$x - 2y - 1 = 0, \quad x^2 - xy = 0$$

[b] If $n(x) = \frac{x^2 - 3x}{(x-3)(x^2+2)}$, then find : $n^{-1}(x)$ and identify the domain of n^{-1}

14

El-Beheira Governorate



Answer the following questions : (Calculator is permitted)

1 Choose the correct answer from the given ones :

1 If $x^2 - y^2 = 12$, $x - y = 3$, then $x + y = \dots$

- (a) 3 (b) 4 (c) 12 (d) 15

2 If $3a = \sqrt{4}b$, then $\frac{a}{b} = \dots$

- (a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) $\frac{3}{4}$ (d) $\frac{4}{3}$

3 If $5x = 5^3$, then $\frac{4}{5}x = \dots$

- (a) 10 (b) 15 (c) 20 (d) 25

4 The number of solution of the two equations $x + y = 1$ and $y + x = 2$ together in $\mathbb{R} \times \mathbb{R}$ is

- (a) zero (b) 1 (c) 2 (d) 3

5 The common domain of the functions n_1, n_2 where $n_1(x) = \frac{x+2}{x^2-4}$, $n_2(x) = \frac{1}{x+1}$ is

- (a) $\{-2, -1, 2\}$ (b) $\mathbb{R} - \{-1, 2\}$
 (c) $\mathbb{R} - \{-2, -1, 2\}$ (d) \mathbb{R}

6 If $A \subset B$, then $P(A \cup B) = \dots$

- (a) zero (b) $P(A)$ (c) $P(B)$ (d) $P(A \cap B)$

Algebra and Probability

- 2** [a] Find the solution set of the following two equations together in $\mathbb{R} \times \mathbb{R}$:

$$y - x = 2 , \quad x^2 + xy - 4 = 0$$

- [b] Find $n(x)$ in the simplest form, showing the domain of n where :

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

- 3** [a] Two acute angles in a right-angled triangle. The difference between their measures is 50° . Find the measure of each angle.

- [b] If $n(x) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$, find :

1 $n^{-1}(x)$ in the simplest form, showing the domain of n^{-1}

2 The value of x if $n^{-1}(x) = 3$

- 4** [a] By using the general formula, find the solution set of the following equation in \mathbb{R} :

$$3x^2 = 5x - 1 \text{ (rounding the results to two decimal places).}$$

- [b] If $n_1(x) = \frac{2x}{2x+4}$, $n_2(x) = \frac{x^2+2x}{x^2+4x+4}$, then prove that : $n_1 = n_2$

- 5** [a] Find $n(x)$ in the simplest form, showing the domain where :

$$n(x) = \frac{x-3}{x^2-7x+12} - \frac{4}{x^2-4x}$$

- [b] If A and B are two events from the sample space of a random experiment and

$$P(A) = 0.8 , \quad P(B) = 0.7 , \quad P(A \cap B) = 0.6$$

, then find : 1 $P(\bar{A})$

2 $P(A \cup B)$

15

El-Fayoum Governorate



Answer the following questions : (Using calculators is allowed)

- 1** Choose the correct answer :

- 1 In the equation : $a x^2 + b x + c = 0$, if : $b^2 - 4ac > 0$, then the equation has roots in \mathbb{R}

(a) 1 (b) 2 (c) zero (d) ∞

- 2 If $3^x = 4$, $4^y = 12$, then $\frac{xy}{x+1} = \dots$

(a) 2 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

- 3 If $n(x) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$, then the domain of n^{-1} is

(a) \mathbb{R} (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{0, 2\}$

Final Examinations

4 If $2^7 \times 3^7 = 6^k$, then $k = \dots$

- (a) 14 (b) 7 (c) 6 (d) 5

5 If A and B are two mutually exclusive events from the sample space S of a random experiment, then $P(A - B) = \dots$

- (a) $P(A)$ (b) $P(\bar{A})$ (c) $P(B)$ (d) $P(\bar{B})$

6 The rule which describes the pattern $\left(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots\right)$ where $n \in \mathbb{Z}_+$ is \dots

- (a) $\frac{2}{n+1}$ (b) $n + \frac{1}{2}$ (c) $\frac{n}{n+1}$ (d) $\frac{2n-1}{n+1}$

2 [a] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following pair of equations :

$$3x - y + 4 = 0, \quad y = 2x + 3$$

[b] Reduce $n(x) = \frac{x^2 - x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$ to the simplest form, showing the domain of n

3 [a] By using the general formula, find in \mathbb{R} the solution set of the equation :

$$x^2 + 3x + 5 = 0$$

[b] If $n(x) = \frac{x^2 - 49}{x^3 - 8} \div \frac{x + 7}{x - 2}$, find the simplest form of $n(x)$, showing the domain, then find $n(1)$

4 [a] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^3 - x^2 - 6x}{x^3 - 9x}$, show whether $n_1 = n_2$ or not. (give a reason)

[b] The sum of two real numbers is 9, and the difference between their squares equals 45, find the two numbers.

5 [a] If the set of zeroes of the function $f : f(x) = ax^2 + bx + 15$ is $\{3, 5\}$, find the values of a and b

[b] If A and B are two events of the sample space of a random experiment

$$, P(A) = P(\bar{A}), \quad P(A \cap B) = \frac{1}{16}, \quad P(B) = \frac{5}{8} P(A)$$

, find : 1 P(B) 2 P(A ∪ B)

16

Beni Suef Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

1 If a coin is tossed once, then the probability of appearing a tail equals \dots

- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) 1

هذا العمل خاص بموقع ذاكرولي التعليمي ولا يسمح بتداوله على مواقع أخرى

Algebra and Probability

- 2** The set of zeroes of the function f where $f(X) = \frac{X-3}{X-2}$ is
 (a) {zero} (b) {2} (c) {3} (d) {2, 3}
- 3** The equation $3x + 4y + x^2y = 5$ is of the degree.
 (a) zero (b) first (c) second (d) third
- 4** The domain of the function f where $f(X) = \frac{X-3}{2}$ is
 (a) \mathbb{R} (b) $\mathbb{R} - \{-2\}$ (c) $\mathbb{R} - \{3\}$ (d) $\mathbb{R} - \{-2, 3\}$
- 5** If $x + y = xy = 10$, then $x^2y + xy^2 =$
 (a) 10 (b) 20 (c) 30 (d) 100
- 6** The solution set of the two equations : $y = 4$, $x + y = 7$ together in $\mathbb{R} \times \mathbb{R}$ is
 (a) (3, 4) (b) (4, 3) (c) {(3, 4)} (d) {(4, 3)}

2 [a] Find in \mathbb{R} by using the general formula , the solution set of the equation :

$$x^2 - 2(x + 1) = 0$$

[b] If $n_1(X) = \frac{5x}{5x+25}$, $n_2(X) = \frac{x^2+5x}{x^2+10x+25}$, then prove that : $n_1 = n_2$

3 [a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x + y = 7 \quad , \quad x^2 + y^2 = 25$$

[b] Find $n(X)$ in its simplest form , showing the domain where :

$$n(X) = \frac{x^2}{x^2 - 3x} \div \frac{3x}{x^2 - 9}$$

4 [a] If A , B are two events from the sample space of a random experiment and

$$P(A) = 0.7 \quad , \quad P(B) = 0.5 \text{ and } P(A \cap B) = 0.3$$

, find : $P(\bar{A})$, $P(A - B)$ and $P(A \cup B)$

[b] If the set of zeroes of the function f where $f(X) = x^2 - 10x + a$ is $\{5\}$

, then find the value of a

5 [a] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$$3x + y = 3 \quad , \quad 2x - y = 7$$

[b] Find $n(X)$ in its simplest form , showing the domain where :

$$n(X) = \frac{x^2 + x + 1}{x^3 - 1} + \frac{x^2 - x - 2}{x^2 - 1}$$

17

El-Menia Governorate



Answer the following questions : (Calculators are allowed)

1 Choose the correct answer from those given :

- [1] If $k < 0$, which of the following quantities is the greatest in the numerical value ?
 - (a) $5 - k$
 - (b) $5 + k$
 - (c) $5k$
 - (d) $\frac{5}{k}$
- [2] If $a + b = 3$, $a^2 - ab + b^2 = 5$, then $a^3 + b^3 = \dots$
 - (a) 8
 - (b) 9
 - (c) 15
 - (d) 25
- [3] Half the number $4^6 = \dots$
 - (a) 2^3
 - (b) 2^6
 - (c) 4^3
 - (d) 2^{11}
- [4] The S.S. of the two equations $x = 3$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is
 - (a) $\{(3, 4)\}$
 - (b) $\{(4, 3)\}$
 - (c) \mathbb{R}
 - (d) \emptyset
- [5] If A, B are two mutually exclusive events from the sample space of a random experiment, then $P(A \cap B) = \dots$
 - (a) \emptyset
 - (b) zero
 - (c) 0.5
 - (d) 1
- [6] The simplest form of the function $f : f(x) = \frac{2x}{x+1} + \frac{x}{x+1}$ is
 - (a) $\frac{3x}{x+1}$
 - (b) 3
 - (c) 2
 - (d) $\frac{2}{x+1}$

- [2] [a] Find the S.S. in \mathbb{R} for the equation : $3x^2 - 5x + 1 = 0$, using the general rule, rounding the result to one decimal place.

- [b] Find $n(x)$ in the simplest form, showing the domain :

$$n(x) = \frac{x^3 - 8}{x^2 - 5x + 6} \div \frac{x^2 + 2x + 4}{x - 3}$$

- [3] [a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations : $2x + y = 1$, $x + 2y = 5$ algebraically.

- [b] Find $n(x)$ in the simplest form showing the domain where :

$$n(x) = \frac{x^2 - 2x - 15}{x^2 - 9} - \frac{10 - 2x}{x^2 - 8x + 15}$$

- [4] [a] Find the S.S. in \mathbb{R}^2 of the two equations : $x + y = 2$, $\frac{1}{x} + \frac{1}{y} = 2$

$$\text{[b] If } n_1(x) = \frac{x^2}{x^3 - x^2}, \quad n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x},$$

prove that : $n_1 = n_2$

Algebra and Probability

5 [a] If $n(X) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$, find $n^{-1}(X)$, showing the domain.

[b] If A, B are two events from the sample space of a random experiment
 $P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$
find : 1 P(A ∪ B) 2 P(A - B)

18

Assiut Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer :

1 If $\frac{1}{3}x = 8$, then $\frac{1}{6}x = \dots$

(a) $\frac{4}{3}$

(b) 4

(c) 48

(d) 16

2 If there are an infinite number of solutions of the equations $x + 6y = 3$, $2x + ky = 6$ in $\mathbb{R} \times \mathbb{R}$, then $k = \dots$

(a) 4

(b) 6

(c) 12

(d) 21

3 The set of zeroes of the function f where $f(x) = x^2 - 3$ is \dots

(a) $\{\sqrt{3}\}$ (b) $\{-\sqrt{3}\}$ (c) $\{3\}$ (d) $\{-\sqrt{3}, \sqrt{3}\}$

4 $\frac{3}{\sqrt{5}+\sqrt{2}} = \dots$

(a) $3\sqrt{5}$ (b) $2\sqrt{5}$ (c) $\sqrt{5}-\sqrt{2}$ (d) $\sqrt{5}+\sqrt{2}$

5 If the curve of the function f where $f(x) = x^2 - m$ passes through the point (3, 0), then $m = \dots$

(a) 3

(b) -3

(c) 6

(d) 9

6 If $X \subset S$ and \bar{X} is the complementary event to event X , then $P(X \cap \bar{X}) = \dots$

(a) zero

(b) S

(c) \emptyset

(d) 1

2 [a] Find the solution set of the two following equations algebraically in $\mathbb{R} \times \mathbb{R}$:

$$3x - y + 4 = 0, \quad y = 2x + 3$$

[b] If $n(x) = \frac{x^2 - 49}{x^3 - 8} \div \frac{x+7}{x-2}$, then find $n(x)$ in the simplest form and identify the domain and find $n(1)$

3 [a] By using the general formula, find in \mathbb{R} the solution set of the equation :

$$x(x-1) = 5, \text{ rounding the results to one decimal place.}$$

[b] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^3 - x^2 - 6x}{x^3 - 9x}$

, prove that : $n_1(x) = n_2(x)$ for the values of x which belong to the common domain and find this domain.

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 2$, $x^2 + y^2 = 20$

[b] If $Z(f) = \{5\}$, $f(x) = x^3 - 3x^2 + a$, find the value of : a

5 [a] Find $n(x)$ in the simplest form, showing the domain of n :

$$n(x) = \frac{x-3}{x^2 - 7x + 12} - \frac{x-3}{3-x}$$

[b] If $S = \{2, 3, 4, 5, 6, 7, 8\}$, $A = \{2, 4, 6, 8\}$, $B = \{2, 3, 5, 7\}$, find : 1 P(A), P(B) 2 $P(A \cup B)$

19

Souhag Governorate



Answer the following questions : (Calculators are allowed)

1 Choose the correct answer :

1 If $x \neq 0$, then $\frac{5x}{x^2 + 1} \div \frac{x}{x^2 + 1} = \dots$

- (a) -5 (b) -1 (c) 1 (d) 5

2 $f : \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = ax^2 + bx + c$, where $a, b, c \in \mathbb{R}$, $a \neq 0$ is a polynomial function of the degree in x
 (a) second (b) third (c) first (d) zero

3 If $2^x = \frac{1}{4}$, then $x = \dots$

- (a) 2 (b) -2 (c) 1 (d) -1

4 $\sqrt[3]{3 \frac{3}{8}} = \sqrt{2 \frac{1}{4}}$

- (a) = (b) > (c) < (d) ≠

5 If there are an infinite number of solutions in $\mathbb{R} \times \mathbb{R}$ of the two equations :

$x + 4y = 7$, $3x + ky = 21$, then $k = \dots$

- (a) 4 (b) 7 (c) 21 (d) 12

6 If $A \subset S$ of a random experiment and $P(\bar{A}) = 2P(A)$, then $P(A) = \dots$

- (a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) 1

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Algebra and Probability

- 2** [a] By using the general formula (rounding the results to one decimal digit) , find in \mathbb{R} the solution set of the equation : $X(X - 1) = 4$

[b] If $n_1(X) = \frac{x^2}{x^3 - x^2}$, $n_2(X) = \frac{x^3 + x^2 + x}{x^4 - x}$, prove that : $n_1 = n_2$

- 3** [a] Find the solution set of the following equations in $\mathbb{R} \times \mathbb{R}$:

$$x - y = 0 \quad , \quad x^2 + xy + y^2 = 27$$

[b] If $n(X) = \frac{x^2 - 2x}{x^2 - 3x + 2}$, then find : $n^{-1}(X)$ in the simplest form showing the domain of n^{-1}

- 4** [a] Solve in $\mathbb{R} \times \mathbb{R}$: $2x - y = 5$, $x + y = 4$

[b] Simplify : $n(X) = \frac{x^2 + 2x}{x^2 - 4} - \frac{2x - 6}{x^2 - 5x + 6}$, showing the domain.

- 5** [a] Simplify : $n(X) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}$, showing the domain.

[b] If A , B are two mutually exclusive events of a random experiment and $P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$, find : $P(\bar{A})$, $P(A \cup B)$

20

Qena Governorate



Answer the following questions : (Calculators are permitted)

- 1** Choose the correct answer :

1 The domain of the function f where $f(X) = \frac{x-2}{x^2+1}$ is

- (a) $\mathbb{R} - \{-1\}$ (b) $\mathbb{R} - \{1, -1\}$ (c) $\mathbb{R} - \{1\}$ (d) \mathbb{R}

2 $10 + (10)^2 + (10)^3 = \dots$

- (a) 1000 (b) 3000 (c) 1110 (d) 1010

3 The two straight lines : $x - y = 0$, $3x + 2y = 0$ intersect at the point

- (a) (0, 0) (b) (1, 1) (c) (3, 0) (d) (0, 2)

4 $\sqrt{64 + 36} = 8 + \dots$

- (a) 9 (b) 2 (c) 6 (d) 10

5 If $P(A) = 3P(\bar{A})$, then $P(A) = \dots$

- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $\frac{1}{3}$

6 If $ab = 3$, $ab^2 = 12$, then $b = \dots$

- (a) 4 (b) 2 (c) -2 (d) ± 2

- 2** [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - 2 = 0 , y^2 - 3x + 5 = 0$$

- [b] Find $n(x)$ in the simplest form , showing the domain where : $n(x) = \frac{5}{x-3} + \frac{4}{3-x}$

- 3** [a] Graph the function f where $f(x) = x^2 - 2x + 3$ over the interval $[-1, 3]$, then from the graph find in \mathbb{R} the solution set of the equation $x^2 - 2x + 3 = 0$

- [b] If $n(x) = \frac{x^2 + x - 12}{x^2 + 5x + 4}$, find $n^{-1}(x)$, showing the domain of n^{-1} , then find $n^{-1}(0)$

- 4** [a] Find in \mathbb{R} the solution set of the equation :

$$2x^2 - 5x + 1 = 0 , \text{ approximating the results to two decimals.}$$

- [b] If $n_1(x) = \frac{x^3 + 1}{x^3 - x^2 + x}$, $n_2(x) = \frac{x^3 + x^2 + x + 1}{x^3 + x}$, prove that : $n_1 = n_2$

- 5** [a] If A and B are two events from the sample space S , $P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$, find :

1 $P(\bar{A})$

2 $P(A \cup B)$

3 $P(A - B)$

- [b] Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{x^2 + 2x}{x^3 - 27} \div \frac{x+2}{x^2 + 3x + 9}$$

21

Luxor Governorate



Answer the following questions :

- 1** Choose the correct answer :

- 1** If $f(x) = 9$, then $3f(-x) = \dots$

(a) -3 (b) 6 (c) -12 (d) 27

- 2** The set of zeroes of $f : f(x) = \text{zero}$ is

(a) \emptyset (b) \mathbb{R} (c) $\mathbb{R} - \{0\}$ (d) zero

- 3** If $xy = 4$, $xz = 4$, $yz = 4$, where $x, y, z \in \mathbb{R}^+$, then $xyz = \dots$

(a) 64 (b) 12 (c) 8 (d) 4

- 4** If A , B are two events of the sample space of a random experiment , $A \subset B$, $P(A) = 0.2$ and $P(B) = 0.6$, then $P(B - A) = \dots$

(a) 0.2 (b) 0.4 (c) 0.6 (d) 0.8

- 5** $\frac{1}{3}$ the number $(27)^3$ is

(a) 3^3 (b) 3^4 (c) 3^6 (d) 3^8

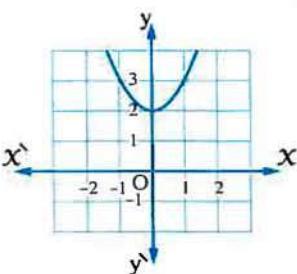
Algebra and Probability

6 From the opposite figure :

The S.S. of $f(x) = 0$

in \mathbb{R} is

- (a) \emptyset (b) $\{2\}$
 (c) $\{0\}$ (d) $\{(0, 2)\}$



2 [a] Find the common domain of the functions defined by the following rules :

$$\frac{x-4}{x^2-5x+6}, \quad \frac{2x}{x^3-9x}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $y + 2x = 7$, $2x^2 + x + 3y = 19$

3 [a] Find $n(x)$ in the simplest form and state the domain :

$$n(x) = \frac{x-3}{x^2-7x+12} - \frac{x-3}{3-x}$$

[b] A class has 40 students , 30 of them succeeded in math , 24 succeeded in science and 20 of them succeeded in both math and science. If one student is chosen at random , find the probability that the student :

- 1** Succeeded in math. **2** Succeeded in science only.
3 Succeeded in one of them at least.

4 [a] Find in \mathbb{R} the solution set of : $2x^2 - x - 2 = 0$ by using the general rule where ($\sqrt{17} \approx 4.12$)

[b] If $n_1(x) = \frac{x}{x^2-1}$, $n_2(x) = \frac{5x}{5x^2-5}$, prove that : $n_1 = n_2$

5 [a] Find $n(x)$ in the simplest form and state the domain if :

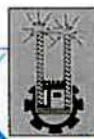
$$n(x) = \frac{x^2-3x}{2x^2-x-6} \div \frac{2x^2-3x}{4x^2-9}$$

[b] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x + 2y = 8, \quad 3x + y = 9$$

22

Aswan Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer :

- 1** The solution set of the two equations $x + y = 0$, $y - 5 = 0$ in $\mathbb{R} \times \mathbb{R}$ is
- (a) \emptyset (b) \mathbb{R} (c) $\{(-5, 5)\}$ (d) $\{(5, -5)\}$

Final Examinations

- 2** If $2^3 \times 5^3 = 10^x$, then $x = \dots$
 (a) zero (b) 3 (c) 6 (d) 9
- 3** If $a^2 - b^2 = 6$, $a - b = \sqrt{3}$, then $(a + b)^2 = \dots$
 (a) 3 (b) 6 (c) 9 (d) 12
- 4** If $(5, x - 4) = (y, 2)$, then $x + y = \dots$
 (a) 6 (b) 8 (c) 11 (d) 25
- 5** If $f(x) = x^2 + x + a$ and the set of zeroes of the function f is $\{1, -2\}$, then
 $a = \dots$
 (a) 2 (b) 1 (c) -1 (d) -2
- 6** If $A \subset B$, then $P(A \cup B) = \dots$
 (a) zero (b) $P(A)$ (c) $P(B)$ (d) $P(A \cap B)$

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$3x - y = -4, \quad y - 2x = 3$$

[b] Find $n(x)$ in the simplest form, showing the domain of n where :

$$n(x) = \frac{x^2 + 4x + 3}{x^3 - 27} \div \frac{x+3}{x^2 + 3x + 9}$$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - y = 1, \quad x^2 + y^2 = 25$$

[b] If $n(x) = \frac{x^2 - 2x}{x^2 - 3x + 2}$

, find : $n^{-1}(x)$ in the simplest form, showing the domain of n^{-1}

4 [a] Using the general rule, find the solution set of the following equation in \mathbb{R} :

$$2x^2 - 5x + 1 = 0$$

[b] Find $n(x)$ in the simplest form, showing the domain of n where :

$$n(x) = \frac{x^2 + 2x}{x^2 - 4} - \frac{2x - 6}{x^2 - 5x + 6}$$

5 [a] If $n_1(x) = \frac{2x}{2x+8}$, $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$, prove that : $n_1 = n_2$

[b] If A, B are two mutually exclusive events and $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$,
 , find : $P(B)$

Algebra and Probability

23 New Valley Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

- 1 The degree of the function $f : f(X) = X + X^2 - 5$ is the
 (a) first (b) second (c) third (d) fourth
- 2 The set of zeroes of the function $f : f(X) = 7$ is
 (a) \emptyset (b) $\{7\}$ (c) \mathbb{R} (d) $\mathbb{R} - \{7\}$
- 3 If $a + b = 3$ and $(a + b)(a + 1) = 15$, then $ab =$
 (a) -4 (b) 4 (c) -6 (d) 6
- 4 The number of solutions of the equation : $X = 3$ in $\mathbb{R} \times \mathbb{R}$ is
 (a) zero (b) 1 (c) 2 (d) an infinite number.
- 5 If A and B are two mutually exclusive events of a random experiment , then :
 $P(A \cap B) =$
 (a) $P(A)$ (b) \emptyset (c) zero (d) $P(B)$
- If n_1 and n_2 are two algebraic fractions , the domain of $n_1 = \mathbb{R} - X_1$
 (where X_1 is the set of zeroes of the denominator of n_1) and the domain of $n_2 = \mathbb{R} - X_2$
 (where X_2 is the set of zeroes of the denominator of n_2)
 , then the common domain of n_1 and n_2 equals
 (a) $X_1 \cup X_2$ (b) $X_1 \cap X_2$
 (c) $(\mathbb{R} - X_1) \cup (\mathbb{R} - X_2)$ (d) $(\mathbb{R} - X_1) \cap (\mathbb{R} - X_2)$

2 [a] Find $n(X)$ in its simplest form , showing the domain of n :

$$n(X) = \frac{x^2 - 4}{x^2 + 5x + 6}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations :

$$x^2 + y^2 = 17 \quad , \quad y - x = 3$$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations algebraically :

$$3x - 2y = 4 \quad , \quad x + 3y = 5$$

[b] Find $n(X)$ in its simplest form , showing the domain of n :

$$n(X) = \frac{x}{x+2} \div \frac{x^2 - 2x}{\frac{1}{2}x^2 - 2}$$

- 4 [a] If $n_1(x) = \frac{x^3 - 1}{x^3 + x^2 + x}$, $n_2(x) = \frac{x^3 - x^2 + x - 1}{x^3 + x}$
, then prove that : $n_1 = n_2$

[b] Find $n(x)$ in the simplest form, showing the domain of n :

$$n(x) = \frac{3x}{x^2 - 3x} - \frac{x}{x - 3}$$

- 5 [a] If A and B are two events from the sample space of a random experiment, and
 $P(A) = \frac{1}{5}$, $P(B) = \frac{3}{5}$, $P(A \cap B) = \frac{1}{10}$, then find:
1 P(\bar{A}) 2 P($A \cup B$) 3 P($B - A$)

[b] Draw the graph of the function $f : f(x) = x^2 - 2x + 1$ in the interval $[-2, 4]$
, then from the graph find in \mathbb{R} the solution set of the equation : $x^2 - 2x + 1 = 0$

24 South Sinai Governorate



Answer the following questions :

1 Choose the correct answer from those given :

- 1 If $\frac{x}{y} = \frac{3}{4}$, then $\frac{4x}{3y} = \dots$
(a) 1 (b) $\frac{4}{3}$ (c) $\frac{9}{16}$ (d) $\frac{16}{9}$
- 2 If $x^2 = 25$, then $x = \dots$
(a) -5 (b) ± 5 (c) 5 (d) 10
- 3 If $x + 3y = 7$, then $x + 3(y + 5) = \dots$
(a) 3 (b) 7 (c) 22 (d) 21
- 4 The probability of the impossible event equals
(a) 1 (b) $\frac{1}{2}$ (c) -1 (d) zero
- 5 The domain of $f : f(x) = \frac{x+5}{x^2-4}$ is
(a) \mathbb{R} (b) $\mathbb{R} - \{-2, 2\}$ (c) $\mathbb{R} - \{-2\}$ (d) $\mathbb{R} - \{2\}$
- 6 If A and B are mutually exclusive events, then $P(A \cap B) = \dots$
(a) \emptyset (b) zero (c) 0.56 (d) 1

- 2 [a] Find in \mathbb{R} the solution set of the equation : $x^2 - 2x - 6 = 0$ by using
the formula , approximating the result to the nearest two decimal places.

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Algebra and Probability

[b] Find $n(x)$ in the simplest form , showing the domain of n :

$$n(x) = \frac{x}{x+2} + \frac{2x^3}{x^3+2x^2}$$

3 [a] Find $n(x)$ in the simplest form , showing the domain of n :

$$n(x) = \frac{x^2+2x}{x^3-8} \times \frac{x^2+2x+4}{x+2}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically :

$$2x - y = 3 \quad , \quad x + 2y = 4$$

4 [a] If $n_1(x) = \frac{x}{x^2+x}$, $n_2(x) = \frac{x^4-x^3+x^2}{x^5+x^2}$, prove that : $n_1 = n_2$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - y = 7 \quad , \quad xy = 60$$

5 [a] Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x+1}{x^2+3x+2} - \frac{x+2}{x^2-4}$$

[b] If A and B are mutually exclusive events of the sample space of a random experiment and $P(A) = \frac{1}{4}$, $P(A \cup B) = \frac{5}{12}$, find : $P(B)$

25 North Sinai Governorate



Answer the following questions :

1 Choose the correct answer from those given :

- 1 One of the solutions of the inequality : $2x - 3 > 3$ where $x \in \mathbb{Z}$ is
 - (a) $x = 3$
 - (b) $x = -3$
 - (c) $x = 7$
 - (d) $x = -7$
- 2 If $x - y = 3$, $x + y = 9$, then $y =$
 - (a) 6
 - (b) -6
 - (c) 3
 - (d) -3
- 3 If $a = \sqrt[3]{3}$, $b = \frac{1}{\sqrt[3]{3}}$, then $a^{50} \times b^{51} =$
 - (a) 3
 - (b) $\frac{1}{3}$
 - (c) $\sqrt[3]{3}$
 - (d) $\frac{1}{\sqrt[3]{3}}$
- 4 If $n(x) = \frac{x}{x+5}$, then the domain of n^{-1} =
 - (a) \mathbb{R}
 - (b) $\mathbb{R} - \{0\}$
 - (c) $\mathbb{R} - \{5\}$
 - (d) $\mathbb{R} - \{0, -5\}$
- 5 If $x^2 - y^2 = 15$, $x - y = 3$, then $x + y =$
 - (a) 5
 - (b) 13
 - (c) 18
 - (d) 45

Final Examinations

6 If a regular die is tossed once , the probability of appearance of a number less than 3 equals

(a) $\frac{1}{6}$

(b) $\frac{1}{3}$

(c) $\frac{1}{2}$

(d) $\frac{2}{3}$

2 [a] If A , B are two events of a random experiment and

$P(A) = \frac{1}{2}$, $P(A \cap B) = \frac{1}{5}$, $P(B) = \frac{2}{5}$

, find : **1** $P(A \cup B)$

2 $P(A - B)$

[b] Find the common domain of n_1 , n_2 : if $n_1(x) = \frac{-1}{x^2 - 9}$, $n_2(x) = \frac{7}{x}$

3 [a] By using the general rule , find in \mathbb{R} the solution set of the equation : $x^2 - 2x = 4$, rounding the results to two decimal places.

[b] Find $n(x)$ in the simplest form , showing the domain :

$$n(x) = \frac{x^2 - 2x}{x^2 - 4} + \frac{2x + 6}{x^2 + 5x + 6}$$

4 [a] Find the solution set of the following two equations in $\mathbb{R} \times \mathbb{R}$:

$x - y = 0$, $x + y = 16$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, prove that : $n_1 = n_2$

5 [a] If $n(x) = \frac{x^2 - 2x + 1}{x^3 - 1} \div \frac{x - 1}{x^2 + x + 1}$

, find : $n(x)$ in the simplest form , showing the domain of n

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :

$x + y = 4$, $2x - y = 2$

26

Red Sea Governorate



Answer the following questions : (Calculators are allowed)

1 Choose the correct answer from those given :

1 The solution set of the two equations : $x + 2 = 0$, $y = 3$ in $\mathbb{R} \times \mathbb{R}$ is

- (a) $\{(2, 3)\}$ (b) $\{(3, 2)\}$ (c) $\{(-2, 3)\}$ (d) $\{(3, -2)\}$

2 If $2^5 \times 3^5 = 6^m$, then $m =$

- (a) 10 (b) 5 (c) 6 (d) 25

3 If $A \subset S$ of a random experiment , $P(\bar{A}) = 2P(A)$, then $P(A) =$

- (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

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Algebra and Probability

- 4 If $(5, x - 4) = (y, 3)$, then $x + y = \dots$
 (a) 25 (b) 12 (c) 8 (d) 6

- 5 The set of zeroes of f where $f(x) = \text{zero}$ is
 (a) \emptyset (b) zero (c) \mathbb{R} (d) $\mathbb{R} - \{0\}$
- 6 $(-1)^{15} + (-1)^{14} = \dots$
 (a) 1 (b) 2 (c) -2 (d) zero

- 2 [a] Find the S.S. of the following two equations in $\mathbb{R} \times \mathbb{R}$:

$$2x - y = 3, \quad x + 2y = 4$$

- [b] Find $n(x)$ in the simplest form, showing the domain : $n(x) = \frac{x^2}{x-1} + \frac{x}{1-x}$

- 3 [a] By using the general rule, solve the equation : $x^2 - x = 4$ in \mathbb{R}
 , approximating the result to the nearest two decimals

- [b] Prove that $n_1 = n_2$ if : $n_1(x) = \frac{x^3 + 1}{x^3 - x^2 + x}$, $n_2(x) = \frac{x^3 + x^2 + x + 1}{x^3 + x}$

- 4 [a] Find the S.S. in $\mathbb{R} \times \mathbb{R}$ of the two equations : $x - y = 1$, $x^2 + y^2 = 25$

$$\text{[b] If } n(x) = \frac{x^2 - 2x}{x^2 - 5x + 6}$$

1 Find : $n^{-1}(x)$ and identify the domain of n^{-1}

2 If $n^{-1}(x) = 2$, what is the value of x ?

- 5 [a] Find $n(x)$ in the simplest form, showing the domain where :

$$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}$$

- [b] If A and B are two events from the sample space of a random experiment and

$$P(A) = 0.3, \quad P(B) = 0.6, \quad P(A \cap B) = 0.2$$

, find : 1 $P(A \cup B)$ 2 $P(A - B)$

27

Matrouh Governorate



Answer the following questions :

- 1 Choose the correct answer from those given :

- 1 The two straight lines : $x + 2y = 1$, $2x + 4y = 6$ are
 (a) parallel. (b) intersecting.
 (c) perpendicular. (d) intersecting and perpendicular.

- 2** The solution set of the equation : $x^2 = 2x$ in \mathbb{Z} is
 (a) {2} (b) (0, 2) (c) {0, 2} (d) {(0, 2)}
- 3** The intersection point of the two straight lines : $x = 1$ and $y - 2 = 0$ lies on the quadrant.
 (a) first. (b) second. (c) third. (d) fourth.
- 4** If $A \subset B$, then $P(A \cup B) =$
 (a) $P(A)$ (b) $P(B)$ (c) $P(A \cap B)$ (d) zero
- 5** If x is a negative number, then the largest number from the following is
 (a) $5 + x$ (b) $5x$ (c) $5 - x$ (d) $\frac{5}{x}$
- 6** The set of zeroes of the function f where $f(x) = 4$ is
 (a) zero (b) {4} (c) {0, 4} (d) \emptyset

2 [a] By using the general formula , find in \mathbb{R} the solution set of the equation :

$$x + \frac{1}{x} + 3 = 0 \text{ where } x \neq 0, \text{ rounding the results to two decimal places.}$$

[b] If $n(x) = \frac{x^2 - 1}{x^2 - x}$, then reduce $n(x)$ to the simplest form , showing the domain of n

3 [a] Simplify : $n(x) = \frac{x-1}{x^2-1} \div \frac{x^2-5x}{x^2-4x-5}$, showing the domain.

[b] If the sum of two positive numbers is 9 , and the difference between their squares is 27, find the two numbers.

4 [a] If A , B are two events from the sample space of a random experiment and

$$P(A) = 0.3, P(B) = 0.6, P(A \cap B) = 0.2$$

, find : **1** $P(A \cup B)$

2 $P(A - B)$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, then prove that : $n_1 = n_2$

5 [a] Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{3x}{x^2 - x - 2} + \frac{x-1}{1-x^2}$$

[b] Find the solution set of the following two equations graphically in $\mathbb{R} \times \mathbb{R}$:

$$y = x + 4, x + y = 4$$

Answers of Final Examinations

Model 2

1

- [1] a [2] d [3] a [4] b [5] c [6] a

2

[a] $\because 3x^2 - 5x + 1 = 0$

$$\therefore a = 3, b = -5, c = 1$$

$$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{25 - 12}}{6} = \frac{5 \pm \sqrt{13}}{6}$$

$$\therefore x \approx 1.43 \text{ or } x \approx 0.23$$

$$\therefore \text{The S.S.} = \{1.43, 0.23\}$$

[b] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x+3)} \times \frac{x+3}{x^2+2x+4}$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -3\}$$

$$, n(x) = 1$$

3

[a] $\because x - y = 1$

$$\therefore x = y + 1 \quad (1)$$

$$, x^2 + y^2 = 25 \quad (2)$$

Substituting from (1) in (2) :

$$\therefore (y+1)^2 + y^2 = 25$$

$$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$$

$$\therefore 2y^2 + 2y - 24 = 0 \quad \therefore y^2 + y - 12 = 0$$

$$\therefore (y-3)(y+4) = 0$$

$$\therefore y = 3 \text{ or } y = -4$$

Substituting in (1) : $\therefore x = 4 \text{ or } x = -3$

$$\therefore \text{The S.S.} = \{(4, 3), (-3, -4)\}$$

[b] ① $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$= 0.3 + 0.6 - 0.2 = 0.7$$

② $P(A - B) = P(A) - P(A \cap B)$

$$= 0.3 - 0.2 = 0.1$$

4

[a] $\because 2x - y = 3 \quad \therefore y = 2x - 3 \quad (1)$

$$, x + 2y = 4 \quad (2)$$

Substituting from (1) in (2) :

$$\therefore x + 2(2x - 3) = 4$$

$$\therefore x + 4x - 6 = 4 \quad \therefore 5x = 10 \quad \therefore x = 2$$

Substituting in (1) : $\therefore y = 1$

[b] $\because n(x) = \frac{x(x+3)}{(x+3)(x-3)} \div \frac{2x}{x+3}$

$\therefore \text{The domain of } n = \mathbb{R} - \{-3, 3, 0\}$

$$, n(x) = \frac{x}{x-3} \times \frac{x+3}{2x} = \frac{x+3}{2(x-3)}$$

5

[a] $\because n(x) = \frac{x(x+2)}{(x-2)(x+2)} + \frac{x+3}{(x-2)(x-3)}$

$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2, 3\}$

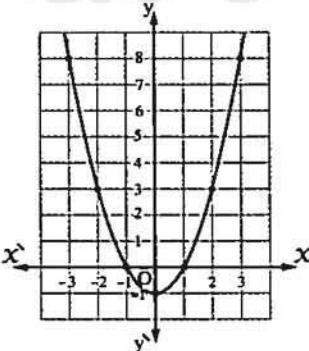
$$, n(x) = \frac{x}{(x-2)} + \frac{x+3}{(x-2)(x-3)}$$

$$= \frac{x(x-3) + x+3}{(x-2)(x-3)} = \frac{x^2 - 3x + x+3}{(x-2)(x-3)}$$

$$= \frac{x^2 - 2x + 3}{(x-2)(x-3)}$$

[b] $f(x) = x^2 - 1$

x	-3	-2	-1	0	1	2	3
y	8	3	0	-1	0	3	8



From the graph :

$$\therefore \text{The S.S.} = \{-1, 1\}$$

Algebra and Probability

Model examination for the
merge students**1****1** 0

2 $\frac{1}{x-2}$

3 $\frac{2}{3}$

4 second**5** second**6** {5}**2****1** a**2** b**3** c**4** b**5** c**6** a**3****1** x**4** ✓**2** x**5** x**3** ✓**6** ✓**4**

1 {(2, 1)}

3 $\mathbb{R} - \{1, -1\}$

5 {5}

2
$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

4
$$\frac{x}{x^2 + 4}$$

6
$$\frac{1}{3}$$

Answers of Final Examinations

Answers of governorates' examinations of algebra & probability

1 Cairo

- 1 d 2 c 3 d 4 b 5 d 6 c

2

[a] Let X and y be two real numbers

$$\therefore X + y = 40 \quad (1)$$

$$\therefore X - y = 10 \quad (2)$$

$$\text{Adding (1) and (2)} : \therefore 2X = 50 \quad \therefore X = 25$$

$$\text{Substituting in (1)} : \therefore y = 15$$

∴ The two real numbers are 25, 15

$$[b] \because n(X) = \frac{X}{X-2} - \frac{2(X+2)}{(X+2)(X-2)}$$

∴ The domain of $n = \mathbb{R} - \{2, -2\}$

$$, n(X) = \frac{X}{X-2} - \frac{X}{X-2} = \frac{X-2}{X-2} = 1$$

3

$$[a] \because X - 3 = 0 \quad \therefore X = 3 \quad (1)$$

$$, X^2 + y^2 = 25 \quad (2)$$

$$\text{Substituting from (1) in (2)} : \therefore 9 + y^2 = 25$$

$$\therefore y^2 = 16 \quad \therefore y = 4 \text{ or } y = -4$$

∴ The S.S. = {(3, 4), (3, -4)}

$$[b] \because n_1(X) = \frac{x^2}{x^2(x-1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\}$$

$$, n_1(X) = \frac{1}{x-1}, \therefore n_2(X) = \frac{x^2+x+1}{(x-1)(x^2+x+1)}$$

∴ The domain of $n_2 = \mathbb{R} - \{1\}$

$$, n_2(X) = \frac{1}{x-1}$$

∴ $n_1(X) = n_2(X)$ for all the values
of $x \in \mathbb{R} - \{0, 1\}$

4

$$[a] \because n(X) = \frac{(X-2)(X^2+2X+4)}{(X+3)(X-2)} \times \frac{X+3}{X^2+2X+4}$$

∴ The domain of $n = \mathbb{R} - \{2, -3\}$, $n(X) = 1$

$$[b] \because 2X^2 + 5X - 6 = 0 \quad \therefore a = 2, b = 5, c = -6$$

$$\therefore X = \frac{-5 \pm \sqrt{(5)^2 - 4 \times 2 \times (-6)}}{2 \times 2} = \frac{-5 \pm \sqrt{73}}{4}$$

$$\therefore X \approx 0.9 \text{ or } X \approx -3.4$$

∴ The S.S. = {0.9, -3.4}

5

$$[a] 1 \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 0.7 + 0.5 - 0.3 = 0.9$$

$$2 \quad P(A - B) = P(A) - P(A \cap B) = 0.7 - 0.3 = 0.4$$

$$[b] 1 \quad \because n(X) = \frac{X}{X+3} \quad \therefore n^{-1}(X) = \frac{X+3}{X}$$

$$\text{, the domain of } n^{-1} = \mathbb{R} - \{0, -3\}$$

$$2 \quad \because n^{-1}(X) = 4 \quad \therefore \frac{X+3}{X} = 4$$

$$\therefore 4X = X + 3 \quad \therefore 3X = 3 \quad \therefore X = 1$$

2 Giza

- 1 c 2 d 3 b 4 a 5 c 6 b

$$[a] \because 2X^2 - 5X + 1 = 0 \quad \therefore a = 2, b = -5, c = 1$$

$$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$$

$$\therefore X \approx 2.28 \text{ or } X \approx 0.22$$

∴ The S.S. = {2.28, 0.22}

$$[b] \because n(X) = \frac{(X+2)(X-2)}{(X-2)(X^2+2X+4)} \div \frac{(X+2)(X-3)}{X^2+2X+4}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2, 3\}$$

$$, n(X) = \frac{(X+2)(X-2)}{(X-2)(X^2+2X+4)} \times \frac{X^2+2X+4}{(X+2)(X-3)}$$

$$= \frac{1}{X-3}$$

3

[a] Let the lengths of the two sides of the right angle
be X cm. and y cm.

$$\therefore X + y + 10 = 24 \quad \therefore X + y = 14$$

$$\therefore X = 14 - y \quad (1)$$

$$, X^2 + y^2 = 100 \quad (2)$$

$$\text{Substituting from (1) in (2)} : \therefore (14 - y)^2 + y^2 = 100$$

$$\therefore 196 - 28y + y^2 + y^2 - 100 = 0$$

$$\therefore 2y^2 - 28y + 96 = 0 \text{ (Dividing by 2)}$$

$$\therefore y^2 - 14y + 48 = 0 \quad \therefore (y-6)(y-8) = 0$$

$$\therefore y = 6 \quad \text{or} \quad y = 8$$

$$\text{Substituting in (1)} : \therefore X = 8 \text{ or } X = 6$$

∴ The side lengths of the right angle are 6 cm.
and 8 cm.

Answers of Final Examinations

[2] $\because n^{-1}(x) = 3 \quad \therefore \frac{x^2 + 2}{x} = 3$
 $\therefore x^2 + 2 = 3x \quad \therefore x^2 - 3x + 2 = 0$
 $\therefore (x-2)(x-1) = 0$
 $\therefore x = 2$ (refused) or $x = 1$

[b] A and B are mutually exclusive events

$$\therefore P(A \cup B) = P(A) + P(B)$$

$$\therefore P(B) = P(A \cup B) - P(A) = \frac{7}{12} - \frac{1}{3} = \frac{1}{4}$$

4) El-Kalyoubia

1

- [1] b [2] d [3] c [4] a [5] c [6] c

2

[a] [1] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.8 + 0.7 - 0.6 = 0.9$

[2] $P(\bar{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

[b] Let the length be X cm. and the width be y cm.

$$\therefore X - y = 4 \quad (1)$$

$$, 2(X+y) = 28 \text{ (Dividing by 2)}$$

$$\therefore X + y = 14 \quad (2)$$

$$\text{Adding (1) and (2)} : \therefore 2X = 18 \quad \therefore X = 9$$

Substituting in (1) : $\therefore y = 5$

\therefore The length = 9 cm., the width = 5 cm.

\therefore The area of the rectangle = $9 \times 5 = 45 \text{ cm}^2$

3

[a] $\because X - y = 0 \quad \therefore X = y \quad (1)$

$$, X^2 + XY + Y^2 = 27 \quad (2)$$

Substituting from (1) in (2) : $\therefore Y^2 + Y^2 + Y^2 = 27$

$$\therefore 3Y^2 = 27 \quad \therefore Y^2 = 9$$

$$\therefore Y = 3 \text{ or } Y = -3$$

Substituting in (1) : $\therefore X = 3 \text{ or } X = -3$

\therefore The S.S. = $\{(3, 3), (-3, -3)\}$

[b] $\because n(x) = \frac{x(x+2)}{(x-3)(x^2+3x+9)} \div \frac{x+2}{x^2+3x+9}$

\therefore The domain of $n = \mathbb{R} - \{3, -2\}$

$$, n(x) = \frac{x(x+2)}{(x-3)(x^2+3x+9)} \times \frac{x^2+3x+9}{x+2}$$

$$= \frac{x}{x-3}$$

4

[a] $\because 2x^2 - 4x + 1 = 0$

$$\therefore a = 2, b = -4, c = 1$$

$$\therefore x = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{4 \pm 2\sqrt{2}}{4} = \frac{2 \pm \sqrt{2}}{2}$$

$$\therefore x \approx 1.7 \text{ or } x \approx 0.3 \quad \therefore \text{The S.S.} = \{1.7, 0.3\}$$

[b] $\because n_1(x) = \frac{2x}{2(x+2)}$

\therefore The domain of $n_1 = \mathbb{R} - \{-2\}$ } (1)

$$, n_1(x) = \frac{x}{x+2}$$

$$, n_2(x) = \frac{x(x+2)}{(x+2)(x+2)}$$

\therefore The domain of $n_2 = \mathbb{R} - \{-2\}$ } (2)

$$, n_2(x) = \frac{x}{x+2}$$

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(x) = \frac{x^2 + 2x + 4}{(x-2)(x^2 + 2x + 4)} + \frac{(x-3)(x+3)}{(x+3)(x-2)}$

\therefore The domain of $n = \mathbb{R} - \{2, -3\}$

$$, n(x) = \frac{1}{x-2} + \frac{x-3}{x-2} = \frac{x-2}{x-2} = 1$$

[b] \because The domain of $f = \mathbb{R} - \{2, k\}$

$$\therefore \text{where } x = 2 \quad \therefore x^2 - 5x + m = 0$$

$$\therefore 4 - 5 \times 2 + m = 0 \quad \therefore m = 6$$

$$, f(x) = \frac{x}{x^2 - 5x + 6}$$

$$, f(x) = \frac{x}{(x-2)(x-3)}$$

\therefore The domain of $f = \mathbb{R} - \{2, 3\} \quad \therefore k = 3$

5) El-Sharkia

1

- [1] d [2] b [3] d [4] a [5] d [6] d

2

[a] $\because x(x-2) = 1 \quad \therefore x^2 - 2x - 1 = 0$

$$\therefore a = 1, b = -2, c = -1$$

$$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2 \times 1}$$

$$= \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$$

$$\therefore x = 1 + \sqrt{2} \text{ or } x = 1 - \sqrt{2}$$

\therefore The S.S. = $\{1 + \sqrt{2}, 1 - \sqrt{2}\}$

Answers of Final Examinations

[b] $\because x + y = 4 \quad \therefore y = 4 - x \quad (1)$
 $, \frac{1}{x} + \frac{1}{y} = 1 \quad \therefore y + x = xy \quad (2)$

Substituting from (1) in (2) :

$$\begin{aligned} \therefore 4 - x + x &= x(4 - x) \quad \therefore 4 = 4x - x^2 \\ \therefore x^2 - 4x + 4 &= 0 \quad \therefore (x-2)(x-2) = 0 \\ \therefore x &= 2 \end{aligned}$$

Substituting in (1) : $\therefore y = 2$

$$\therefore \text{The S.S.} = \{(2, 2)\}$$

5

[a] $\because n_1 = \frac{(x+3)(x+2)}{(x+2)(x-1)}$
 $\therefore \text{The domain of } n_1 = \mathbb{R} - \{-2, 1\} \quad \left. \begin{array}{l} , n_1(x) = \frac{x+3}{x-1} \\ , \therefore n_2(x) = \frac{(x-5)(x+3)}{(x-5)(x-1)} \end{array} \right\} (1)$
 $\therefore \text{The domain of } n_2 = \mathbb{R} - \{5, 1\} \quad \left. \begin{array}{l} , n_2(x) = \frac{x+3}{x-1} \end{array} \right\} (2)$

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_2 \neq$ the domain of n_1

[b] 1 $\because P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $\therefore P(A \cap B) = P(A) + P(B) - P(A \cup B)$
 $= \frac{1}{4} + \frac{1}{2} - \frac{5}{8} = \frac{1}{8}$

2 $P(B - A) = P(B) - P(A \cap B) = \frac{1}{2} - \frac{1}{8} = \frac{3}{8}$

3 $P(A \cup B) = 1 - P(A \cap B) = 1 - \frac{5}{8} = \frac{3}{8}$

7 El-Gharbia

1

- 1 c 2 d 3 b 4 d 5 c 6 d

2

[a] $\because P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $\therefore 0.8 = 0.5 + x - 0.1 \quad \therefore x = 0.4$
 $, \therefore P(A - B) = P(A) - P(A \cap B) = 0.5 - 0.1 = 0.4$

[b] $\because n(x) = \frac{x(x-2)+x}{x-2} = \frac{x^2-2x+x}{x-2}$
 $= \frac{x^2-x}{x-2} = \frac{x(x-1)}{x-2}$
 $\therefore n^{-1}(x) = \frac{x-2}{x(x-1)}$
 $, \text{the domain of } n^{-1} = \mathbb{R} - \{0, 1, 2\}$

3

[a] $\because n(x) = \frac{x}{x-2} - \frac{x}{x+2}$
 $\therefore \text{The domain of } n = \mathbb{R} - \{2, -2\}$
 $, n(x) = \frac{x(x+2)-x(x-2)}{(x-2)(x+2)}$
 $= \frac{x^2+2x-x^2+2x}{(x-2)(x+2)} = \frac{4x}{(x-2)(x+2)}$

[b] $\because x - y = 3 \quad \therefore x = y + 3 \quad (1)$

$$, y^2 - xy = 21 \quad (2)$$

Substituting from (1) in (2) : $\therefore y^2 - (y+3)y = 21$

$$\therefore y^2 - y^2 - 3y = 21$$

$$\therefore 3y = 21 \quad \therefore y = 7$$

Substituting in (1) : $\therefore x = 10$

$$\therefore \text{The S.S.} = \{(10, 7)\}$$

4

[a] $\because x^2 + 2x - 4 = 0$
 $\therefore a = 1, b = 2, c = -4$
 $\therefore x = \frac{-2 \pm \sqrt{(2)^2 - 4 \times 1 \times (-4)}}{2 \times 1}$
 $= \frac{-2 \pm \sqrt{20}}{2} = \frac{-2 \pm 2\sqrt{5}}{2} = -1 \pm \sqrt{5}$
 $\therefore x = -1 + \sqrt{5} \text{ or } x = -1 - \sqrt{5}$

$$\text{The S.S.} = \{-1 + \sqrt{5}, -1 - \sqrt{5}\}$$

[b] $\because n_1(x) = \frac{(x-2)(x+2)}{(x+3)(x-2)}$
 $\therefore \text{The domain of } n_1 = \mathbb{R} - \{-3, 2\} \quad \left. \begin{array}{l} , n_1(x) = \frac{x+2}{x+3} \\ , \therefore n_2(x) = \frac{(x-3)(x+2)}{(x+3)(x-3)} \end{array} \right\} (1)$
 $\therefore \text{The domain of } n_2 = \mathbb{R} - \{-3, 3\} \quad \left. \begin{array}{l} , n_2(x) = \frac{x+2}{x+3} \end{array} \right\} (2)$

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_1 \neq$ the domain of n_2

5

[a] $\because n(x) = \frac{(x-1)(x^2+x+1)}{x(x-1)} \div \frac{x^2+x+1}{x+3}$
 $\therefore \text{The domain of } n = \mathbb{R} - \{0, 1, -3\}$
 $, n(x) = \frac{(x-1)(x^2+x+1)}{x(x-1)} \times \frac{x+3}{x^2+x+1} = \frac{x+3}{x}$

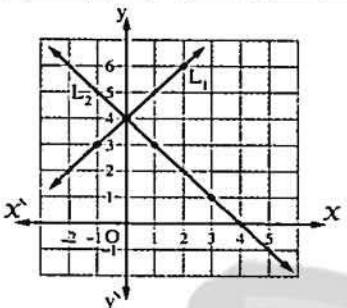
Algebra and Probability

[b] $y = x + 4$

x	-1	0	2
y	3	4	6

$$x = 4 - y$$

x	3	1	0
y	1	3	4



From the graph : ∴ The S.S. = {(0, 4)}

8

El-Dakahlia

1

- [a] 1 b 2 a 3 a

[b] ∵ $3x - y = 5$ (1)

$$, x + 2y = 4 \quad \therefore x = 4 - 2y \quad (2)$$

Substituting from (2) in (1) : ∴ $3(4 - 2y) - y = 5$

$$\therefore 12 - 6y - y = 5 \quad \therefore -7y = -7$$

$$\therefore y = 1$$

Substituting in (2) : ∴ $x = 2$

$$\therefore \text{The S.S.} = \{(2, 1)\}$$

2

- [a] 1 a 2 d 3 d

[b] ∵ $n(x) = \frac{x(x+1)}{(x-1)(x+1)} + \frac{x-5}{(x-1)(x-5)}$

∴ The domain of $n = \mathbb{R} - \{-1, 1, 5\}$

$$, n(x) = \frac{x}{(x-1)} + \frac{1}{(x-1)} = \frac{x+1}{x-1}$$

3

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$= 0.6 + 0.5 - 0.3 = 0.8$$

$$\therefore P(\bar{B}) = 1 - P(B) \quad \therefore P(\bar{B}) = 1 - 0.5 = 0.5$$

[b] ∵ $n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)^2} \times \frac{2(x-1)}{x^2+x+1}$

∴ The domain of $n = \mathbb{R} - \{1\}$, $n(x) = 2$

4

[a] ∵ $n_1(x) = \frac{x(x-1)}{x^2(x-2)}$

∴ The domain of $n_1 = \mathbb{R} - \{0, 2\}$

$$, n_1(x) = \frac{x-1}{x(x-2)} \quad \} \quad (1)$$

$$, \therefore n_2(x) = \frac{(x-2)(x-1)}{x(x-2)(x-2)}$$

∴ The domain of $n_2 = \mathbb{R} - \{0, 2\}$

$$, n_2(x) = \frac{x-1}{x(x-2)} \quad \} \quad (2)$$

From (1) and (2) : ∴ $n_1 = n_2$

[b] ∵ $2x^2 - 4x + 1 = 0$

$$\therefore a = 2, b = -4, c = 1$$

$$\therefore x = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 2 \times 1}}{2 \times 2}$$

$$= \frac{4 \pm \sqrt{8}}{4} = \frac{4 \pm 2\sqrt{2}}{4} = \frac{2 \pm \sqrt{2}}{2}$$

$$\therefore x \approx 1.71 \text{ or } x \approx 0.29$$

$$\text{The S.S.} = \{1.71, 0.29\}$$

5

[a] ∵ $x - y = 0$

$$\therefore x = y \quad (1)$$

$$, x = \frac{4}{y} \quad (2)$$

$$\text{Substituting from (1) in (2) : } \therefore x = \frac{4}{x}$$

$$\therefore x^2 = 4 \quad \therefore x = \pm \sqrt{4}$$

$$\therefore x = 2 \text{ or } x = -2$$

$$\text{Substituting in (1) : } \therefore y = 2 \quad \text{or} \quad y = -2$$

$$\therefore \text{The S.S.} = \{(2, 2), (-2, -2)\}$$

[b] 1 ∵ $n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$$

, the domain of $n^{-1} = \mathbb{R} - \{0, 2\}$

$$, n^{-1}(x) = \frac{x^2+2}{x}$$

2 ∵ $n^{-1}(x) = 3 \quad \therefore \frac{x^2+2}{x} = 3$

$$\therefore x^2 + 2 = 3x \quad \therefore x^2 - 3x + 2 = 0$$

$$\therefore (x-2)(x-1) = 0$$

$$\therefore x = 2 \text{ (refused)} \quad \text{or} \quad x = 1$$

Answers of Final Examinations

9 Ismailia

1

- c b d a c b

2

[a] $\because 2x + y = 1 \quad \therefore y = 1 - 2x \quad (1)$
 $, x + 2y = 5 \quad (2)$

Substituting from (1) in (2) :

$$\begin{aligned} \therefore x + 2(1 - 2x) &= 5 \\ \therefore x + 2 - 4x &= 5 \\ \therefore x &= -1 \end{aligned}$$

Substituting in (1) : $y = 3$

$$\therefore \text{The S.S.} = \{(-1, 3)\}$$

[b] $\because n_1(x) = \frac{x^2 - 3x + 9}{(x+3)(x^2 - 3x + 9)}$
 $\therefore \text{The domain of } n_1 = \mathbb{R} - \{-3\}$
 $, n_1(x) = \frac{1}{x+3} \quad \left. \begin{array}{l} \\ \end{array} \right\} (1)$
 $, \because n_2(x) = \frac{2}{2(x+3)} \quad \left. \begin{array}{l} \\ \end{array} \right\} (2)$
 $\therefore \text{The domain of } n_2 = \mathbb{R} - \{-3\}$
 $, n_2(x) = \frac{1}{x+3}$
From (1) and (2) : $\therefore n_1 = n_2$

3

[a] $\because 3x^2 - 6x + 1 = 0$
 $\therefore a = 3, b = -6, c = 1$
 $\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{6 \pm \sqrt{24}}{6}$
 $= \frac{6 \pm 2\sqrt{6}}{6} = \frac{3 \pm \sqrt{6}}{3}$

$$\therefore x \approx 1.82 \text{ or } x \approx 0.18$$

$$\text{The S.S.} = \{1.82, 0.18\}$$

[b] $\because \text{The domain of } n = \mathbb{R} - \{3\}$

$$\begin{aligned} \therefore \text{At } x = 3 &\quad \therefore x^2 - ax + 9 = 0 \\ \therefore 9 - 3a + 9 &= 0 \quad \therefore -3a = -18 \quad \therefore a = 6 \end{aligned}$$

4

[a] Let the two numbers be x and y

$$\therefore xy = 10 \quad (1)$$

$$, x - y = 3 \quad \therefore x = y + 3 \quad (2)$$

Substituting from (2) in (1) : $\therefore (y+3)y = 10$

$$\therefore y^2 + 3y - 10 = 0 \quad \therefore (y-2)(y+5) = 0$$

$$\therefore y = 2 \text{ or } y = -5$$

Substituting in (2) : $x = 5$ or $x = -2$ $\therefore \text{The two numbers are : } 5, 2 \text{ or } -2, -5$

[b] $\because n(x) = \frac{(x+5)(x-1)}{(x-2)(x^2+2x+4)} \div \frac{x+5}{x^2+2x+4}$

 $\therefore \text{The domain of } n = \mathbb{R} - \{2, -5\}$

$$\begin{aligned} , n(x) &= \frac{(x+5)(x-1)}{(x-2)(x^2+2x+4)} \times \frac{x^2+2x+4}{x+5} \\ &= \frac{x-1}{x-2} \\ , \therefore n(3) &= \frac{3-1}{3-2} = 2 \end{aligned}$$

 $, n(2) \text{ is undefined because } 2 \notin \text{the domain of } n$

5

[a] $\because n(x) = \frac{x(x-3)}{(x-3)(x+3)} + \frac{x-1}{(x+3)(x-1)}$

 $\therefore \text{The domain of } n = \mathbb{R} - \{3, -3, 1\}$

$$, n(x) = \frac{x}{x+3} + \frac{1}{x+3} = \frac{x+1}{x+3}$$

[b] [1] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.4 + 0.5 - 0.2 = 0.7$

[2] $P(A - B) = P(A) - P(A \cap B)$
 $= 0.4 - 0.2 = 0.2$

10 Suez

1

- c b a c b c

2

[a] $\because x - y = 3 \quad \therefore x = y + 3 \quad (1)$

$$, 2x + y = 9 \quad (2)$$

Substituting from (1) in (2) : $\therefore 2(y+3) + y = 9$

$$\therefore 2y + 6 + y = 9 \quad \therefore 3y = 3 \quad \therefore y = 1$$

Substituting in (1) : $\therefore x = 4$

$$\therefore \text{The S.S.} = \{(4, 1)\}$$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x+2)} + \frac{2(x+3)}{(x+3)(x+2)}$

 $\therefore \text{The domain of } n = \mathbb{R} - \{2, -2, -3\}$

$$, n(x) = \frac{x}{x+2} + \frac{2}{x+2} = \frac{x+2}{x+2} = 1$$

Algebra and Probability

[3]

[a] $x - y = 0 \quad \therefore x = y$ (1)
 $, xy = 9$

Substituting from (1) in (2) : $\therefore x^2 = 9$
 $\therefore x = \pm\sqrt{9}$

$\therefore x = 3$ or $x = -3$

Substituting in (1) : $\therefore y = 3$ or $y = -3$

\therefore The S.S. = $\{(3, 3), (-3, -3)\}$

[b] $\because n(x) = \frac{(x+3)(x-1)}{x+3} \times \frac{x+1}{(x-1)(x+1)}$
 \therefore The domain of $n = \mathbb{R} - \{-3, 1, -1\}$
 $, n(x) = 1$

[4]

[a] [1] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.3 + 0.6 - 0.2 = 0.7$

[2] $P(\bar{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

[b] $\because n(x) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \div \frac{x-1}{x^2+x+1}$
 \therefore The domain of $n = \mathbb{R} - \{1\}$
 $, n(x) = \frac{x-1}{x^2+x+1} \times \frac{x^2+x+1}{x-1} = 1$

[5]

[a] $\because x^2 - 2x - 6 = 0$
 $\therefore a = 1, b = -2, c = -6$
 $\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-6)}}{2 \times 1}$
 $= \frac{2 \pm \sqrt{28}}{2} = \frac{2 \pm 2\sqrt{7}}{2} = 1 \pm \sqrt{7}$

$\therefore x \approx 3.65$ or $x \approx -1.65$

\therefore The S.S. = $\{3.65, -1.65\}$

[b] $\because n_1(x) = \frac{2x}{2(x+2)}$
 \therefore The domain of $n_1 = \mathbb{R} - \{-2\}$
 $, n_1(x) = \frac{x}{x+2} \quad \left. \begin{array}{l} \\ \end{array} \right\} (1)$

$\because n_2(x) = \frac{x(x+2)}{(x+2)(x+2)}$
 \therefore The domain of $n_2 = \mathbb{R} - \{-2\}$
 $, n_2(x) = \frac{x}{x+2} \quad \left. \begin{array}{l} \\ \end{array} \right\} (2)$

From (1) and (2) : $\therefore n_1 = n_2$

[11]

Port Said

[1]

[1] b [2] c [3] b [4] d [5] d [6] a

[2]

[a] \because The domain of $n = \mathbb{R} - \{3\}$

$$\therefore (3)^2 - 3a + 9 = 0 \quad \therefore 18 - 3a = 0$$

$$\therefore -3a = -18 \quad \therefore a = 6$$

[b] Let the length be x cm. and the width be y cm.

$$\therefore 2(x+y) = 22 \quad \therefore y = 11 - x \quad (1)$$

$$, xy = 24 \quad (2)$$

Substituting from (1) in (2) : $\therefore x(11-x) = 24$

$$\therefore 11x - x^2 - 24 = 0 \text{ (Multiplying by -1)}$$

$$\therefore x^2 - 11x + 24 = 0$$

$$(x-3)(x-8) = 0 \quad \therefore x = 3 \text{ or } x = 8$$

Substituting in (1) : $\therefore y = 8$ or $y = 3$

\therefore The length = 8 cm. , the width = 3 cm.

[3]

[a] $\because x^2 - 2x - 1 = 0$

$$\therefore a = 1, b = -2, c = -1$$

$$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2 \times 1} = \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$$

$\therefore x \approx 2.4$ or $x \approx -0.4$

\therefore The S.S. = $\{2.4, -0.4\}$

[b] $\because n(x) = \frac{x^2+x+1}{x} \div \frac{(x-1)(x^2+x+1)}{x(x-1)}$

\therefore The domain of $n = \mathbb{R} - \{0, 1\}$

$$, n(x) = \frac{x^2+x+1}{x} \times \frac{x}{x^2+x+1} = 1$$

[4]

[a] $\because x+3y=7 \quad \therefore x=7-3y \quad (1)$

$$, 5x-y=3 \quad (2)$$

Substituting from (1) in (2) : $\therefore 5(7-3y)-y=3$

$$\therefore 35-15y-y=3 \quad \therefore -16y=-32 \quad \therefore y=2$$

Substituting in (1) : $\therefore x=1$

\therefore The S.S. = $\{(1, 2)\}$

[b] $\because n(x) = \frac{x(x+2)}{(x-2)(x+2)} + \frac{x-3}{(x-3)(x-2)}$

\therefore The domain of $n = \mathbb{R} - \{2, -2, 3\}$

$$, n(x) = \frac{x}{x-2} + \frac{1}{x-2} = \frac{x+1}{x-2}$$

5

[a] 1 The probability that the number on the card is a multiple of 5 = $\frac{5}{20} = \frac{1}{4}$

2 The probability that the number on the card is a multiple of 5 = $\frac{4}{20} = \frac{1}{5}$

3 The probability that the number on the card is a multiple of 4 or 5 = $\frac{8}{20} = \frac{2}{5}$

[b] $\therefore n_1(x) = \frac{x+3}{(x-3)(x+3)}$

\therefore The domain of $n_1 = \mathbb{R} - \{-3\}$

$$\therefore n_1(x) = \frac{1}{x-3}$$

$$\therefore \therefore n_2(x) = \frac{2}{2(x-3)}$$

\therefore The domain of $n_2 = \mathbb{R} - \{3\}$

$$\therefore n_2(x) = \frac{1}{x-3}$$

$$\therefore n_1(x) = n_2(x)$$

for all the values of $x \in \mathbb{R} - \{-3\}$

12

Damietta

1

- 1 a 2 b 3 d 4 a 5 b 6 a

2

[a] $\therefore x + \frac{4}{x} = 6$

$$\therefore x^2 + 4 = 6x \quad \therefore x^2 - 6x + 4 = 0$$

$$\therefore a = 1, b = -6, c = 4$$

$$\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 1 \times 4}}{2 \times 1} = \frac{6 \pm \sqrt{20}}{2} = \frac{6 \pm 2\sqrt{5}}{2} \\ = 3 \pm \sqrt{5}$$

$$\therefore x \approx 5.2 \text{ or } x \approx 0.8$$

\therefore The S.S. = {5.2, 0.8}

[b] $\therefore n(x) = \frac{2x}{x-3} \div \frac{x(x+2)}{(x+3)(x-3)}$

\therefore The domain of $n = \mathbb{R} - \{3, -3, 0, -2\}$

$$\therefore n(x) = \frac{2x}{x-3} \times \frac{(x+3)(x-3)}{x(x+2)} = \frac{2(x+3)}{x+2}$$

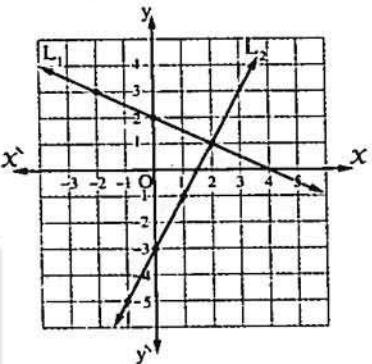
3

[a] $X = 4 - 2y$

$$y = 2X - 3$$

x	-2	0	2
y	3	2	1

x	1	0	-1
y	-1	-3	-5



From the graph : \therefore The S.S. = {(2, 1)}

[b] $\therefore n(x) = \frac{x^2 - 2x + 4}{(x+2)(x^2 - 2x + 4)} + \frac{(x-1)(x+1)}{(x+2)(x-1)}$

\therefore The domain of $n = \mathbb{R} - \{-2, 1\}$

$$\therefore n(x) = \frac{1}{x+2} + \frac{x+1}{x+2} = \frac{x+2}{x+2} = 1$$

4

[a] $\therefore n_1(x) = \frac{x(x+2)}{(x+2)(x+2)}$

\therefore The domain of $n_1 = \mathbb{R} - \{-2\}$

$$\therefore n_1(x) = \frac{x}{x+2} \quad \left. \begin{array}{l} \\ \end{array} \right\} (1)$$

$$\therefore n_2(x) = \frac{2x}{2(x+2)} \quad \left. \begin{array}{l} \\ \end{array} \right\} (2)$$

$$\therefore n_2(x) = \frac{x}{x+2} \quad \left. \begin{array}{l} \\ \end{array} \right\} (2)$$

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\therefore x - y = 2 \quad \therefore x = y + 2$

$$\therefore x^2 + y^2 = 20$$

Substituting from (1) in (2) : $\therefore (y+2)^2 + y^2 = 20$

$$\therefore y^2 + 4y + 4 + y^2 = 20$$

$$\therefore 2y^2 + 4y - 16 = 0 \text{ (Dividing by 2)}$$

$$\therefore y^2 + 2y - 8 = 0 \quad \therefore (y+4)(y-2) = 0$$

$$\therefore y = -4 \text{ or } y = 2$$

Substituting in (1) : $\therefore x = -2 \text{ or } x = 4$

\therefore The S.S. = {(-2, -4), (4, 2)}

Algebra and Probability

5

- [a] ∵ The domain of $n = \mathbb{R} - \{5\}$
 $\therefore (5)^2 - 5a + 25 = 0$
 $\therefore -5a = -50 \quad \therefore a = 10$

[b] ① $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.8 + 0.7 - 0.6 = 0.9$

② $P(\bar{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

13) Kafr El-Sheikh

1

- [a] **1** c **2** a **3** d

[b] $\because n(x) = \frac{(2x+3)(x-2)}{x(x-3)} \div \frac{(2x-3)(2x+3)}{x(2x-3)}$

\therefore The domain of $n = \mathbb{R} - \{0, 3, \frac{3}{2}, -\frac{3}{2}\}$

, $n(x) = \frac{(2x+3)(x-2)}{x(x-3)} \times \frac{x}{(2x+3)} = \frac{x-2}{x-3}$

2

- [a] **1** c **2** d **3** c

[b] $\because n_1(x) = \frac{x}{x(x-1)}$

\therefore The domain of $n_1 = \mathbb{R} - \{0, 1\}$

, $n_1(x) = \frac{1}{x-1}$

, $n_2(x) = \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

\therefore The domain of $n_2 = \mathbb{R} - \{0, -1\}$

, $n_2(x) = \frac{1}{x-1}$

From (1) and (2) : $\therefore n_1 = n_2$

3

- $$\begin{aligned}
 \text{[a]} \quad & 3x^2 + 1 = 5x \\
 \therefore & 3x^2 - 5x + 1 = 0 \\
 \therefore a = 3, b = -5, c = 1 \\
 \therefore x = & \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6} \\
 \therefore x \approx & 1.43 \text{ or } x = 0.23 \\
 \therefore \text{The S.S.} = & \{1.43, 0.23\}
 \end{aligned}$$

- $$\text{[b]} \quad \boxed{1} : z(n_2) = \{-3\} \quad \therefore 6 - a(-3) = 0$$

$$\therefore 6 + 3a = 0 \quad \therefore 3a = -6 \quad \therefore a = -2$$

2 $\vdash \mathbf{n}(X) = \mathbf{n}_-(X) = \mathbf{n}_+(X)$

$$\therefore n(x) = \frac{x^2 - 2x - 15}{x^2 - 9} - \frac{2x + 6}{x^2 - 6x + 9}$$

$$= \frac{(x-5)(x+3)}{(x-3)(x+3)} - \frac{2(x+3)}{(x-3)(x-3)}$$

\therefore The domain of n is $\mathbb{R} - \{-3, 3\}$

$$n(x) = \frac{x-5}{x-3} - \frac{2(x+3)}{(x-3)(x-3)}$$

$$= \frac{(x-5)(x-3) - 2(x+3)}{(x-3)(x-3)}$$

$$= \frac{x^2 - 8x + 15 - 2x - 6}{(x-3)(x-3)}$$

$$= \frac{x^2 - 10x + 9}{(x-3)(x-3)} = \frac{(x-1)(x-9)}{(x-3)(x-3)}$$

4

- $$\begin{aligned} \text{[a]} : 3x + 2y &= 4 & (1) \\ , x - 3y &= 5 \quad \therefore x = 3y + 5 & (2) \\ \text{Substituting from (2) in (1)}: \\ \therefore 3(3y + 5) + 2y &= 4 \\ \therefore 9y + 15 + 2y &= 4 \quad \therefore 11y = -11 \quad \therefore y = -1 \\ \text{Substituting in (2)}: \therefore x &= 2 \\ \therefore \text{The S.S.} &= \{(2, -1)\} \end{aligned}$$

- $$\begin{aligned}
 \text{[b]} \because 2 P(B) = P(\bar{B}) &\quad \therefore 2 P(B) = 1 - P(B) \\
 \therefore 3 P(B) = 1 &\quad \therefore P(B) = \frac{1}{3} \\
 \boxed{1} P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\
 &= \frac{1}{2} + \frac{1}{3} - \frac{1}{6} = \frac{2}{3} \\
 \boxed{2} \because A, B &\text{ are mutually exclusive events} \\
 \therefore P(A \cap B) &= 0 \\
 \therefore P(A \cup B) &= P(A) + P(B) = \frac{1}{2} + \frac{1}{3} =
 \end{aligned}$$

5

- $$\begin{aligned}
 [a] \because x - 2y - 1 &= 0 & \therefore x = 2y + 1 & (1) \\
 , x^2 - xy &= 0 & & (2) \\
 \text{Substituting from (1) in (2):} \\
 \therefore (2y+1)^2 - (2y+1)y &= 0 \\
 \therefore 4y^2 + 4y + 1 - 2y^2 - y &= 0 \\
 \therefore 2y^2 + 3y + 1 &= 0 \\
 \therefore (2y+1)(y+1) &= 0 & \therefore y = -\frac{1}{2} \text{ or } y = -1 \\
 \text{Substituting in (1): } \therefore x &= 0 \text{ or } x = -1 \\
 \therefore \text{The S.S.} &= \left\{ \left(0, -\frac{1}{2}\right), (-1, -1) \right\}
 \end{aligned}$$

Answers of Final Examinations

[b] $\therefore n(x) = \frac{x(x-3)}{(x-3)(x^2+2)}$
 $\therefore n^{-1}(x) = \frac{(x-3)(x^2+2)}{x(x-3)}$
 $\therefore \text{The domain of } n^{-1} = \mathbb{R} - \{0, 3\}$
 $, n^{-1}(x) = \frac{x^2+2}{x}$

14) El-Beheira

1

- 1 b 2 a 3 c 4 a 5 c 6 c

2

[a] $\because y - x = 2 \quad \therefore y = x + 2 \quad (1)$
 $, x^2 + xy - 4 = 0 \quad (2)$

Substituting from (1) in (2) :

$$\begin{aligned} & \therefore x^2 + x(x+2) - 4 = 0 \\ & \therefore x^2 + x^2 + 2x - 4 = 0 \\ & \therefore 2x^2 + 2x - 4 = 0 \text{ (Dividing by 2)} \\ & \therefore x^2 + x - 2 = 0 \\ & (x-1)(x+2) = 0 \\ & \therefore x = 1 \quad \text{or} \quad x = -2 \end{aligned}$$

Substituting in (1) : $\therefore y = 3 \quad \text{or} \quad y = 0$ $\therefore \text{The S.S.} = \{(1, 3), (-2, 0)\}$

[b] $\therefore n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)(x-1)} \times \frac{2(x-1)}{x^2+x+1}$
 $\therefore \text{The domain of } n = \mathbb{R} - \{1\}, n(x) = 2$

3

[a] Let the measure of the first angle be x°
, the measure of the second angle be y°

$\therefore x + y = 90^\circ \quad (1)$

$, x - y = 50^\circ \quad (2)$

$\text{Adding (1) and (2) : } \therefore 2x = 140^\circ \quad \therefore x = 70^\circ$

$\text{Substituting in (1) : } \therefore y = 20^\circ$

$\therefore \text{The measures of the two angles are } 70^\circ, 20^\circ$

[b] 1 $\therefore n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$
 $\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

$\therefore \text{The domain of } n^{-1} = \mathbb{R} - \{0, 2\}$

$, n^{-1}(x) = \frac{x^2+2}{x}$

2 $\therefore n^{-1}(x) = 3 \quad \therefore \frac{x^2+2}{x} = 3$
 $\therefore x^2 - 3x + 2 = 0 \quad \therefore (x-2)(x-1) = 0$
 $\therefore x = 2 \text{ (refused) or } x = 1$

4

[a] $\because 3x^2 = 5x - 1 \quad \therefore 3x^2 - 5x + 1 = 0$
 $\therefore a = 3, b = -5, c = 1$
 $\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$
 $\therefore x \approx 1.43 \text{ or } x \approx 0.23$
 $\therefore \text{The S.S.} = \{1.43, 0.23\}$

[b] $\therefore n_1(x) = \frac{2x}{2(x+2)}$
 $\therefore \text{The domain of } n_1 = \mathbb{R} - \{-2\}$
 $, n_1(x) = \frac{x}{x+2} \quad \left. \begin{array}{l} \\ \therefore n_2(x) = \frac{x(x+2)}{(x+2)(x+2)} \end{array} \right\} (1)$
 $\therefore \text{The domain of } n_2 = \mathbb{R} - \{-2\}$
 $, \therefore n_2(x) = \frac{x}{x+2} \quad \left. \begin{array}{l} \\ \end{array} \right\} (2)$

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\therefore n(x) = \frac{x-3}{(x-3)(x-4)} - \frac{4}{x(x-4)}$
 $\therefore \text{The domain of } n = \mathbb{R} - \{3, 4, 0\}$
 $\therefore n(x) = \frac{1}{x-4} - \frac{4}{x(x-4)} = \frac{x-4}{x(x-4)} = \frac{1}{x}$

[b] 1 $P(\bar{A}) = 1 - P(A) = 1 - 0.8 = 0.2$
2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.8 + 0.7 - 0.6 = 0.9$

15) El-Fayoum

1

- 1 b 2 b 3 d 4 b 5 a 6 c

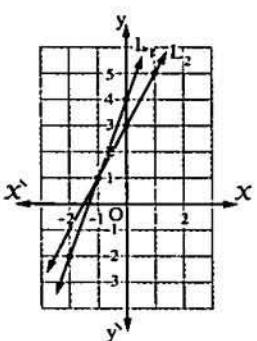
2

[a] $y = 3x + 4 \qquad \qquad \qquad y = 2x + 3$

x	-2	-1	0
y	-2	1	4

x	-1	0	1
y	1	3	5

Algebra and Probability



From the graph :

$$\therefore \text{The S.S.} = \{(-1, 1)\}$$

$$[b] \because n(x) = \frac{x(x-1)}{(x+1)(x-1)} + \frac{x-5}{(x-5)(x-1)}$$

$$\begin{aligned} \therefore \text{The domain of } n &= \mathbb{R} - \{-1, 1, 5\} \\ , n(x) &= \frac{x}{x+1} + \frac{1}{x-1} = \frac{x(x-1) + x+1}{(x+1)(x-1)} \\ &= \frac{x^2 - x + x + 1}{(x+1)(x-1)} \\ &= \frac{x^2 + 1}{(x+1)(x-1)} \end{aligned}$$

3

$$[a] \because x^2 + 3x + 5 = 0$$

$$\therefore a = 1, b = 3, c = 5$$

$$\therefore x = \frac{-3 \pm \sqrt{(3)^2 - 4 \times 1 \times 5}}{2 \times 1} = \frac{-3 \pm \sqrt{-11}}{2}$$

The S.S. = \emptyset

$$[b] \because n(x) = \frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)} \div \frac{x+7}{x-2}$$

\therefore The domain of $n = \mathbb{R} - \{2, -7\}$

$$\begin{aligned}, n(x) &= \frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)} \times \frac{x-2}{x+7} \\ &= \frac{x-7}{x^2+2x+4}\end{aligned}$$

$$\therefore n(1) = \frac{1-7}{1+2+4} = \frac{-6}{7}$$

4

$$[a] \because n_1(x) = \frac{(x-2)(x+2)}{(x+3)(x-2)}$$

\therefore The domain of $n_1 = \mathbb{R} - \{-3, 2\}$

$$, n_1(x) = \frac{x+2}{x+3}$$

$$, \therefore n_2(x) = \frac{x(x^2-x-6)}{x(x^2-9)} = \frac{x(x-3)(x+2)}{x(x-3)(x+3)}$$

\therefore The domain of $n_2 = \mathbb{R} - \{0, 3, -3\}$

$$, n_2(x) = \frac{x+2}{x+3}$$

$$\therefore n_1 \neq n_2$$

Because the domain of $n_1 \neq$ the domain of n_2

[b] Let x and y be two real numbers

$$\therefore x+y=9 \quad \therefore y=9-x \quad (1)$$

$$, x^2-y^2=45 \quad (2)$$

$$\text{Substituting from (1) in (2) : } \therefore x^2-(9-x)^2=45$$

$$\therefore x^2-(81-18x+x^2)=45$$

$$\therefore x^2-81+18x-x^2=45$$

$$\therefore 18x=126 \quad \therefore x=7$$

$$\text{Substituting in (1) : } \therefore y=2$$

\therefore The two real numbers are : 7, 2

5

$$[a] \because Z(f) = \{3, 5\}$$

$$\therefore \text{At } x=3 \quad \therefore a \times 3^2 + 3 \times b + 15 = 0$$

$$\therefore 9a + 3b + 15 = 0 \quad \therefore 3a + b + 5 = 0 \quad (1)$$

At $x=5$

$$\therefore a \times 5^2 + b \times 5 + 15 = 0$$

$$\therefore 25a + 5b + 15 = 0$$

$$\therefore 5a + b + 3 = 0 \quad (2)$$

Subtracting (1) from (2) :

$$\therefore 2a - 2 = 0 \quad \therefore a = 1$$

$$\text{Substituting in (1) : } \therefore 3 \times 1 + b + 5 = 0$$

$$\therefore 3 + b = -5 \quad \therefore b = -8$$

$$[b] \because P(A) = P(\bar{A}) \quad \therefore P(A) = 1 - P(A)$$

$$\therefore 2P(A) = 1 \quad \therefore P(A) = \frac{1}{2}$$

$$1 \because P(B) = \frac{5}{8} P(A)$$

$$\therefore P(B) = \frac{5}{8} \times \frac{1}{2} = \frac{5}{16}$$

$$2 P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{1}{2} + \frac{5}{16} - \frac{1}{16} = \frac{3}{4}$$

16

Beni Suef

1

1 b

2 c

3 d

4 a

5 d

6 c

2

a

$$\therefore x^2 - 2x - 2 = 0$$

$$\therefore a = 1, b = -2, c = -2$$

Answers of Final Examinations

$$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-2)}}{2+1} = \frac{2 \pm \sqrt{12}}{2} = \frac{2 \pm 2\sqrt{3}}{2} = 1 \pm \sqrt{3}$$

\therefore The S.S. = $\{1 + \sqrt{3}, 1 - \sqrt{3}\}$

[b] $\because n_1(x) = \frac{5x}{5(x+5)}$

\therefore The domain of $n_1 = \mathbb{R} - \{-5\}$

$$, n_1(x) = \frac{x}{x+5}$$

$$, \therefore n_2(x) = \frac{x(x+5)}{(x+5)^2}$$

\therefore The domain of $n_2 = \mathbb{R} - \{-5\}$

$$, n_2(x) = \frac{x}{x+5}$$

From (1), (2) : $\therefore n_1 = n_2$

3

[a] $\because x + y = 7 \quad \therefore y = 7 - x$

$$, x^2 + y^2 = 25$$

Substituting from (1) in (2) :

$$\therefore x^2 + (7-x)^2 = 25$$

$$\therefore x^2 + 49 - 14x + x^2 - 25 = 0$$

$$\therefore 2x^2 - 14x + 24 = 0 \quad (\text{Dividing by 2})$$

$$\therefore x^2 - 7x + 12 = 0 \quad \therefore (x-3)(x-4) = 0$$

$$\therefore x = 3 \quad \text{or} \quad x = 4$$

Substituting in (1) : $\therefore y = 4$ or $y = 3$

$$\therefore \text{The S.S.} = \{(3, 4), (4, 3)\}$$

[b] $\because n(x) = \frac{x^2}{x(x-3)} \div \frac{3x}{(x+3)(x-3)}$

\therefore The domain of $n = \mathbb{R} - \{0, 3, -3\}$

$$, n(x) = \frac{x}{x-3} \times \frac{(x+3)(x-3)}{3x} = \frac{x+3}{3}$$

4

[a] $P(\bar{A}) = 1 - P(A) = 1 - 0.7 = 0.3$

$$P(A - B) = P(A) - P(A \cap B)$$

$$= 0.7 - 0.3 = 0.4$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 0.7 + 0.5 - 0.3 = 0.9$$

[b] $\because Z(f) = \{5\} \quad \therefore \text{At } x = 5$

$$\therefore x^2 - 10x + a = 0 \quad \therefore (5)^2 - 10 \times 5 + a = 0$$

$$\therefore 25 - 50 + a = 0 \quad \therefore a = 25$$

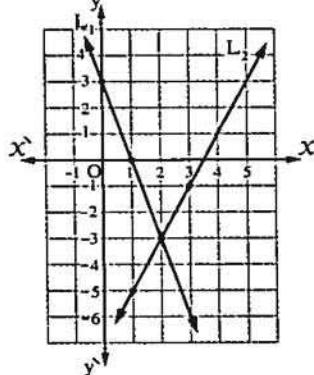
5

[a] $y = 3 - 3x$

$$, y = 2x - 7$$

x	0	1	2
y	3	0	-3

x	1	2	3
y	-5	-3	-1



From the graph :

$$\therefore \text{The S.S.} = \{(2, -3)\}$$

[b] $\because n(x) = \frac{x^2 + x + 1}{(x-1)(x^2 + x + 1)} + \frac{(x-2)(x+1)}{(x-1)(x+1)}$

\therefore The domain of $n = \mathbb{R} - \{1, -1\}$

$$, n(x) = \frac{1}{x-1} + \frac{x-2}{x-1} = \frac{x-1}{x-1} = 1$$

El-Menia

1

1 a

2 c

3 d

4 a

5 b

6 a

2

[a] $\because 3x^2 - 5x + 1 = 0$

$$\therefore a = 3, b = -5, c = 1$$

$$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$$

$$\therefore x \approx 1.4 \text{ or } x \approx 0.2$$

$$\therefore \text{The S.S.} = \{1.4, 0.2\}$$

[b] $\because n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x-3)(x-2)} \div \frac{x^2 + 2x + 4}{x-3}$

\therefore The domain of $n = \mathbb{R} - \{3, 2\}$

$$, n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x-3)(x-2)} \times \frac{x-3}{x^2 + 2x + 4} = 1$$

3

[a] $\because 2x + y = 1$

$$, x + 2y = 5 \quad \therefore x = 5 - 2y$$

Substituting from (2) in (1) : $\therefore 2(5 - 2y) + y = 1$

Answers of Final Examinations

4

[a] $\because X - y = 2 \quad \therefore X = y + 2 \quad (1)$

$$\therefore x^2 + y^2 = 20 \quad (2)$$

Substituting from (1) in (2) :

$$\therefore (y+2)^2 + y^2 = 20$$

$$\therefore y^2 + 4y + 4 + y^2 = 20$$

$$\therefore 2y^2 + 4y + 4 - 20 = 0 \quad (\text{Dividing by 2})$$

$$\therefore y^2 + 2y - 8 = 0$$

$$\therefore (y+4)(y-2) = 0$$

$$\therefore y = -4 \quad \text{or} \quad y = 2$$

Substituting in (1) :

$$\therefore X = -2 \quad \text{or} \quad X = 4$$

$$\therefore \text{The S.S.} = \{(-2, -4), (4, 2)\}$$

[b] $\because Z(f) = \{5\}$

$$\therefore (5)^3 - 3(5)^2 + a = 0 \quad \therefore 125 - 75 + a = 0$$

$$50 + a = 0 \quad \therefore a = -50$$

5

[a] $\because n(x) = \frac{x-3}{(x-4)(x-3)} + \frac{x-3}{x-3}$

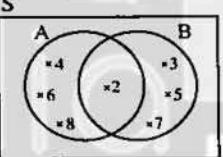
\therefore The domain of $n = \mathbb{R} - \{4, 3\}$

$$\therefore n(x) = \frac{1}{x-4} + 1 = \frac{1+x-4}{x-4} = \frac{x-3}{x-4}$$

[b] [1] $P(A) = \frac{4}{7}$

$$\therefore P(B) = 1 - P(A)$$

$$= 1 - \frac{4}{7} = \frac{3}{7}$$



[2] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$= \frac{4}{7} + \frac{4}{7} - \frac{1}{7} = 1$$

19 Souhag

1

- [1] d [2] c [3] b [4] a [5] d [6] c

2

[a] $\because X(X-1) = 4 \quad \therefore X^2 - X - 4 = 0$

$$\therefore a = 1, b = -1, c = -4$$

$$\therefore X = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$$

$$X \approx 2.6 \quad \text{or} \quad X \approx -1.6$$

$$\therefore \text{The S.S.} = \{2.6, -1.6\}$$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

\therefore The domain of $n_1 = \mathbb{R} - \{0, 1\}$

$$\therefore n_1(x) = \frac{1}{x-1}$$

$$\therefore n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)} \\ = \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$$

\therefore The domain of $n_2 = \mathbb{R} - \{0, 1\}$

$$\therefore n_2(x) = \frac{1}{x-1}$$

from (1) and (2) $\therefore n_1 = n_2$

3

[a] $\because X - y = 0 \quad \therefore X = y \quad (1)$

$$\therefore x^2 + xy + y^2 = 27 \quad (2)$$

Substituting from (1) in (2) :

$$\therefore y^2 + y^2 + y^2 = 27 \quad \therefore 3y^2 = 27$$

$$\therefore y^2 = 9 \quad \therefore y = 3 \quad \text{or} \quad y = -3$$

Substituting in (1) : $\therefore X = 3 \quad \text{or} \quad X = -3$

$$\therefore \text{The S.S.} = \{(3, 3), (-3, -3)\}$$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$$

\therefore The domain of $n^{-1} = \mathbb{R} - \{0, 2, 1\}$

$$\therefore n^{-1}(x) = \frac{x-1}{x}$$

4

[a] $\because 2X - y = 5 \quad (1)$

$$\therefore X + y = 4 \quad (2)$$

Adding (1) and (2) : $\therefore 3X = 9 \quad \therefore X = 3$

Substituting in (2) : $\therefore y = 1$

[b] $\because n(x) = \frac{x(x+2)}{(x+2)(x-2)} - \frac{2(x-3)}{(x-3)(x-2)}$

\therefore The domain of $n = \mathbb{R} - \{-2, 2, 3\}$

$$\therefore n(x) = \frac{x}{x-2} - \frac{2}{x-2} = \frac{x-2}{x-2} = 1$$

5

[a] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x+3)} \times \frac{x+3}{x^2+2x+4}$

\therefore The domain of $n = \mathbb{R} - \{2, -3\}$, $n(x) = 1$

Answers of Final Examinations

\therefore The domain of $n_2 = \mathbb{R} - \{0, 3, -3\}$

\therefore The common domain = $\mathbb{R} - \{2, 3, 0, -3\}$

[b] $y + 2x = 7 \quad \therefore y = 7 - 2x \quad (1)$

$$, 2x^2 + x + 3y = 19 \quad (2)$$

Substituting from (1) in (2) :

$$\therefore 2x^2 + x + 3(7 - 2x) = 19$$

$$\therefore 2x^2 + x + 21 - 6x = 19$$

$$\therefore 2x^2 - 5x + 2 = 0 \quad \therefore (2x - 1)(x - 2) = 0$$

$$\therefore x = \frac{1}{2} \text{ or } x = 2$$

Substituting (1) : $\therefore y = 6 \text{ or } y = 3$

$$\therefore \text{The S.S.} = \left\{ \left(\frac{1}{2}, 6 \right), (2, 3) \right\}$$

[3]

[a] $\therefore n(x) = \frac{x-3}{(x-3)(x-4)} + \frac{x-3}{x-3}$

\therefore The domain of $n = \mathbb{R} - \{3, 4\}$

$$, n(x) = \frac{1}{x-4} + 1 = \frac{1}{x-4} + \frac{x-4}{x-4} = \frac{x-3}{x-4}$$

[b] [1] The probability of the student succeeded in Math = $\frac{30}{40} = \frac{3}{4}$

[2] The probability of the student succeeded in Science only = $\frac{4}{40} = \frac{1}{10}$

[3] The probability of the succeeded in one of them at least = $\frac{34}{40} = \frac{17}{20}$

[4]

[a] $\therefore 2x^2 - x - 2 = 0$

$$\therefore a = 2, b = -1, c = -2$$

$$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 2 \times (-2)}}{2 \times 2}$$

$$= \frac{1 \pm \sqrt{17}}{4} = \frac{1 \pm 4.12}{4}$$

$$\therefore x \approx 1.28 \text{ or } x \approx -0.78$$

$$\therefore \text{The S.S.} = \{1.28, -0.78\}$$

[b] $\therefore n_1(x) = \frac{x}{(x-1)(x+1)}$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{1, -1\} \quad \left. , n_1(x) = \frac{x}{(x-1)(x+1)} \right\} (1)$$

$$, \therefore n_2(x) = \frac{5x}{5(x^2-1)} = \frac{5x}{5(x-1)(x+1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{1, -1\} \quad \left. , n_2(x) = \frac{x}{(x-1)(x+1)} \right\} (2)$$

from (1) and (2) : $\therefore n_1 = n_2$

[5]

[a] $\therefore n(x) = \frac{x(x-3)}{(2x+3)(x-2)} \div \frac{x(2x-3)}{(2x-3)(2x+3)}$

\therefore The domain of $n = \mathbb{R} - \left\{ -\frac{3}{2}, 2, 0, \frac{3}{2} \right\}$

$$, n(x) = \frac{x(x-3)}{(2x+3)(x-2)} \times \frac{(2x-3)(2x+3)}{x(2x-3)} \\ = \frac{x-3}{x-2}$$

[b] $\therefore x+2y=8 \quad (1)$

$$, 3x+y=9 \text{ (multiplying by -2)}$$

$$\therefore -6x-2y=-18 \quad (2)$$

Adding (1) and (2) : $-5x = -10$

$$\therefore x=2$$

Substituting in (1) : $\therefore y=3$

$$\therefore \text{The S.S.} = \{(2, 3)\}$$

22)

Aswan

[1]

[1] c

[2] b

[3] d

[4] c

[5] d

[6] c

[2]

[a] $\therefore 3x-y=-4 \quad (1)$

$$, y-2x=3 \quad \therefore y=3+2x \quad (2)$$

Substituting from (2) in (1) :

$$\therefore 3x-(3+2x)=-4$$

$$\therefore 3x-3-2x=-4$$

$$\therefore x=-1$$

Substituting in (2) : $\therefore y=1$

$$\therefore \text{The S.S.} = \{(-1, 1)\}$$

[b] $\therefore n(x) = \frac{(x+1)(x+3)}{(x-3)(x^2+3x+9)} \div \frac{x+3}{x^2+3x+9}$

\therefore The domain of $n = \mathbb{R} - \{3, -3\}$

$$, n(x) = \frac{(x+1)(x+3)}{(x-3)(x^2+3x+9)} \times \frac{x^2+3x+9}{x+3} \\ = \frac{x+1}{x-3}$$

[3]

[a] $\therefore x-y=1 \quad \therefore x=y+1 \quad (1)$

$$, x^2+y^2=25 \quad (2)$$

Substituting from (1) in (2) : $\therefore (y+1)^2+y^2=25$

$$\therefore y^2+2y+1+y^2-25=0$$

Algebra and Probability

$$\begin{aligned} \therefore 2y^2 + 2y - 24 &= 0 \quad (\text{Dividing by 2}) \\ \therefore y^2 + y - 12 &= 0 \quad \therefore (y-3)(y+4) = 0 \\ \therefore y = 3 \quad \text{or} \quad y = 4 \\ \text{Substituting in (1)} : \therefore x &= 4 \quad \text{or} \quad x = 5 \\ \therefore \text{The S.S.} &= \{(4, 3), (5, 4)\} \end{aligned}$$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$$

$$\therefore \text{The domain of } n^{-1} = \mathbb{R} - \{0, 2, 1\}$$

$$\therefore n^{-1}(x) = \frac{x-1}{x}$$

[4]

[a] $\because 2x^2 - 5x + 1 = 0$
 $\therefore a = 2, b = -5, c = 1$
 $\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$$\therefore \text{The S.S.} = \left\{ \frac{5 + \sqrt{17}}{4}, \frac{5 - \sqrt{17}}{4} \right\}$$

[b] $\because n(x) = \frac{x(x+2)}{(x+2)(x-2)} - \frac{2(x-3)}{(x-2)(x-3)}$
 $\therefore \text{The domain of } n = \mathbb{R} - \{-2, 2, 3\}$
 $\therefore n(x) = \frac{x}{x-2} - \frac{2}{x-2} = \frac{x-2}{x-2} = 1$

[5]

[a] $\because n_1(x) = \frac{2x}{2(x+4)}$
 $\therefore \text{The domain of } n_1 = \mathbb{R} - \{-4\}$
 $\therefore n_1(x) = \frac{x}{x+4}$

[b] $\because n_2(x) = \frac{x(x+4)}{(x+4)(x+4)}$
 $\therefore \text{The domain of } n_2 = \mathbb{R} - \{-4\}$
 $\therefore n_2(x) = \frac{x}{x+4}$

from (1) and (2) : $\therefore n_1 = n_2$

[b] $\because A, B$ are two mutually exclusive events
 $\therefore P(A \cup B) = P(A) + P(B)$
 $\therefore \frac{7}{12} = \frac{1}{3} + P(B)$
 $\therefore P(B) = \frac{7}{12} - \frac{1}{3} = \frac{7-4}{12} = \frac{3}{12} = \frac{1}{4}$

23 New Valley

- [1] 1 b 2 a 3 a 4 d 5 c 6 d

[2]

[a] $\because n(x) = \frac{(x-2)(x+2)}{(x+2)(x+3)}$
 $\therefore \text{The domain of } n = \mathbb{R} - \{-2, -3\}$
 $\therefore n(x) = \frac{x-2}{x+3}$

[b] $\because x^2 + y^2 = 17 \quad (1)$
 $, y - x = 3 \quad \therefore y = x + 3 \quad (2)$
 $\text{Substituting from (2) in (1)} : \therefore x^2 + (x+3)^2 = 17$
 $\therefore x^2 + x^2 + 6x + 9 = 17$
 $\therefore 2x^2 + 6x - 8 = 0 \quad (\text{Dividing by 2})$
 $\therefore x^2 + 3x - 4 = 0 \quad \therefore (x+4)(x-1) = 0$
 $\therefore x = -4 \quad \text{or} \quad x = 1$
 $\text{Substituting in (2)} : \therefore y = -1 \quad \text{or} \quad y = 4$
 $\therefore \text{The S.S.} = \{(-4, -1), (1, 4)\}$

[3]

[a] $\because 3x - 2y = 4 \quad (1)$
 $, x + 3y = 5 \quad \therefore x = 5 - 3y \quad (2)$
 $\text{Substituting from (2) in (1)} : \therefore 3(5 - 3y) - 2y = 4$
 $\therefore 15 - 9y - 2y = 4 \quad \therefore -11y = -11 \quad \therefore y = 1$
 $\text{Substituting in (2)} : x = 2$
 $\therefore \text{The S.S.} = \{(2, 1)\}$

[b] $\because n(x) = \frac{x}{x+2} \div \frac{2x^2 - 4x}{x^2 - 4}$
 $= \frac{x}{x+2} \div \frac{2x(x-2)}{(x-2)(x+2)}$
 $\therefore \text{The domain of } n = \mathbb{R} - \{2, -2, 0\}$
 $\therefore n(x) = \frac{x}{x+2} \times \frac{(x-2)(x+2)}{2x(x-2)} = \frac{1}{2}$

[4]

[a] $\because n_1(x) = \frac{(x-1)(x^2+x+1)}{x(x^2+x+1)}$
 $\therefore \text{The domain of } n_1 = \mathbb{R} - \{0\}$
 $\therefore n_1(x) = \frac{x-1}{x}$

[b] $\therefore n_2(x) = \frac{x^2(x-1)+(x-1)}{x(x^2+1)} = \frac{(x-1)(x^2+1)}{x(x^2+1)}$

Answers of Final Examinations

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0\} \\ , n_2(x) = \frac{x-1}{x} \quad \left. \right\} \quad (2)$$

from (1) and (2) : $\therefore n_1 = n_2$

$$[b] \because n(x) = \frac{3x}{x(x-3)} - \frac{x}{x-3}$$

$\therefore \text{The domain of } n = \mathbb{R} - \{0, 3\}$

$$, n(x) = \frac{3}{x-3} - \frac{x}{x-3} = \frac{3-x}{x-3} = \frac{-(x-3)}{(x-3)} = -1$$

5

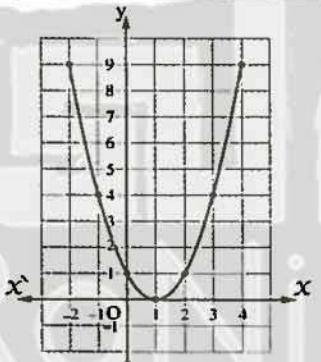
$$[a] 1 P(\bar{A}) = 1 - P(A) = 1 - \frac{1}{5} = \frac{4}{5}$$

$$2 P(A \cup B) = P(A) + P(B) - P(A \cap B) \\ = \frac{1}{5} + \frac{3}{5} - \frac{1}{10} = \frac{7}{10}$$

$$3 P(B - A) = P(B) - P(A \cap B) \\ = \frac{3}{5} - \frac{1}{10} = \frac{5}{10} = \frac{1}{2}$$

$$[b] f(x) = x^2 - 2x + 1$$

x	-2	-1	0	1	2	3	4
y	9	4	1	0	1	4	9



From the graph : $\therefore \text{The S.S.} = \{1\}$

24 South Sinai

1

- [1] a [2] b [3] c [4] d [5] b [6] b

2

$$[a] \because x^2 - 2x - 6 = 0$$

$$\therefore a = 1, b = -2, c = -6$$

$$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-6)}}{2 \times 1}$$

$$= \frac{2 \pm \sqrt{28}}{2} = \frac{2 \pm 2\sqrt{7}}{2} = 1 \pm \sqrt{7}$$

$$\therefore x = 3.65 \text{ or } x = -1.65$$

$$\therefore \text{The S.S.} = \{3.65, -1.65\}$$

$$[b] \because n(x) = \frac{x}{x+2} + \frac{2x^3}{x^2(x+2)}$$

$\therefore \text{The domain of } n = \mathbb{R} - \{-2, 0\}$

$$, n(x) = \frac{x}{x+2} + \frac{2x}{x+2} = \frac{3x}{x+2}$$

3

$$[a] \because n(x) = \frac{x(x+2)}{(x-2)(x^2+2x+4)} \times \frac{x^2+2x+4}{x+2}$$

$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2\}$

$$, n(x) = \frac{x}{x-2}$$

$$[b] \because 2x - y = 3 \quad (1)$$

$$, x + 2y = 4 \quad \therefore x = 4 - 2y \quad (2)$$

Substituting from (2) in (1) : $\therefore 2(4 - 2y) - y = 3$

$$\therefore 8 - 4y - y = 3 \quad \therefore 8 - 5y = 3$$

$$\therefore -5y = -5 \quad \therefore y = 1$$

Substituting in (2) : $\therefore x = 2$

$$\therefore \text{The S.S.} = \{(2, 1)\}$$

4

$$[a] \because n_1(x) = \frac{x}{x(x+1)}$$

$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, -1\} \quad \left. \right\} \quad (1)$

$$, n_1(x) = \frac{1}{x+1}$$

$$, \therefore n_2(x) = \frac{x^2(x^2 - x + 1)}{x^2(x^3 + 1)}$$

$$= \frac{x^2(x^2 - x + 1)}{x^2(x+1)(x^2 - x + 1)}$$

$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, -1\} \quad \left. \right\} \quad (2)$

$$, n_2(x) = \frac{1}{x+1}$$

from (1) and (2) : $\therefore n_1 = n_2$

$$[b] \because x - y = 7 \quad \therefore x = y + 7 \quad (1)$$

$$, xy = 60 \quad (2)$$

Substituting from (1) in (2) : $\therefore (y+7)y = 60$

$$\therefore y^2 + 7y - 60 = 0 \quad \therefore (y+12)(y-5) = 0$$

$$\therefore y = -12 \text{ or } y = 5$$

Substituting in (1) : $\therefore x = -5 \text{ or } x = 12$

$$\therefore \text{The S.S.} = \{(-5, -12), (12, 5)\}$$

5

$$[a] \because n(x) = \frac{x+1}{(x+2)(x+1)} - \frac{x+2}{(x+2)(x-2)}$$

$\therefore \text{The domain of } n = \mathbb{R} - \{-2, -1, 2\}$

Algebra and Probability

$$\begin{aligned} n(x) &= \frac{1}{x+2} - \frac{1}{x-2} \\ &= \frac{x-2-(x+2)}{(x+2)(x-2)} = \frac{x-2-x-2}{(x+2)(x-2)} \\ &= \frac{-4}{(x+2)(x-2)} \end{aligned}$$

[b] ∵ A and B are mutually exclusive events

$$\therefore P(A \cup B) = P(A) + P(B)$$

$$\therefore P(B) = P(A \cup B) - P(A) = \frac{5}{12} - \frac{1}{4} = \frac{1}{6}$$

25 North Sinai

1

- [1] c [2] c [3] d [4] d [5] a [6] b

2

[a] ① $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= \frac{1}{2} + \frac{2}{5} - \frac{1}{5} = \frac{7}{10}$

② $P(A - B) = P(A) - P(A \cap B)$
 $= \frac{1}{2} - \frac{1}{5} = \frac{3}{10}$

[b] ∵ $n_1(x) = \frac{-1}{(x-3)(x+3)}$

∴ The domain of $n_1 = \mathbb{R} - \{3, -3\}$

$$\therefore n_2(x) = \frac{7}{x}$$

∴ The domain of $n_2 = \mathbb{R} - \{0\}$

∴ The common domain = $\mathbb{R} - \{3, -3, 0\}$

3

[a] ∵ $x^2 - 2x - 4 = 0$

$$\therefore a = 1, b = -2, c = -4$$

$$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{2 \pm \sqrt{20}}{2}$$

$$= \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$$

$$\therefore x \approx 3.24 \text{ or } x \approx -1.24$$

∴ The S.S. = {3.24, -1.24}

[b] ∵ $n(x) = \frac{x(x-2)}{(x-2)(x+2)} + \frac{2(x+3)}{(x+3)(x+2)}$

∴ The domain of $n = \mathbb{R} - \{2, -2, -3\}$

$$\therefore n(x) = \frac{x}{x+2} + \frac{2}{x+2} = \frac{x+2}{x+2} = 1$$

4

[a] ∵ $x - y = 0$

$$\therefore x = y$$

Substituting from (1) in (2) : ∴ $y^2 = 16$

$$\therefore y = 4 \text{ or } y = -4$$

Substituting in (1) : ∴ $x = 4 \text{ or } x = -4$

∴ The S.S. = {(4, 4), (-4, -4)}

[b] ∵ $n_1(x) = \frac{x^2}{x^2(x-1)}$

∴ The domain of $n_1 = \mathbb{R} - \{0, 1\}$

$$\therefore n_1(x) = \frac{1}{x-1}$$

$$\therefore n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)}$$

$$= \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$$

∴ The domain of $n_2 = \mathbb{R} - \{0, 1\}$

$$\therefore n_2(x) = \frac{1}{x-1}$$

from (1) and (2) : ∴ $n_1 = n_2$

5

[a] ∵ $n(x) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \div \frac{x-1}{x^2+x+1}$

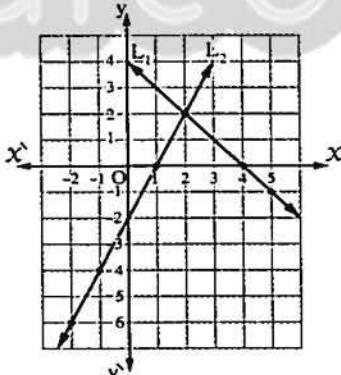
∴ The domain of $n = \mathbb{R} - \{1\}$

$$\therefore n(x) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \times \frac{x^2+x+1}{x-1} = 1$$

[b] $x = 4 - y$ $y = 2x - 2$

x	2	4	5
y	2	0	-1

x	1	-1	-2
y	0	-4	-6



From the graph : ∴ the S.S. = {(2, 2)}

26

Red Sea

1

- [1] c [2] b [3] a [4] b [5] c [6] d

Answers of Final Examinations

2

[a] $\because 2x - y = 3 \quad (1)$
 $, x + 2y = 4 \quad \therefore x = 4 - 2y \quad (2)$

Substituting from (2) in (1) :

$$\begin{aligned} \therefore 2(4 - 2y) - y &= 3 \quad \therefore 8 - 4y - y = 3 \\ \therefore 8 - 5y &= 3 \quad \therefore -5y = -5 \quad \therefore y = 1 \end{aligned}$$

Substituting in (2) : $\therefore x = 2$

$$\therefore \text{The S.S.} = \{(2, 1)\}$$

[b] $\because n(x) = \frac{x^2}{x-1} - \frac{x}{x-1}$
 $\therefore \text{The domain of } n = \mathbb{R} - \{1\}$
 $, n(x) = \frac{x^2}{x-1} - \frac{x}{x-1} = \frac{x^2 - x}{x-1} = \frac{x(x-1)}{x-1} = x$

3

[a] $\because x^2 - x - 4 = 0$
 $\therefore a = 1, b = -1, c = -4$
 $\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$
 $\therefore x \approx 2.56 \quad \text{or} \quad x \approx -1.56$

[b] $\because n_1(x) = \frac{(x+1)(x^2-x+1)}{x(x^2-x+1)}$
 $\therefore \text{The domain of } n_1 = \mathbb{R} - \{0\}$
 $, n_1(x) = \frac{x+1}{x} \quad \left. \begin{array}{l} \\ \end{array} \right\} (1)$
 $, \because n_2(x) = \frac{x^2(x+1)+x+1}{x(x^2+1)} = \frac{x+1(x^2+1)}{x(x^2+1)}$
 $\therefore \text{The domain of } n_2 = \mathbb{R} - \{0\}$
 $, n_2(x) = \frac{x+1}{x} \quad \left. \begin{array}{l} \\ \end{array} \right\} (2)$

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] $\because x - y = 1 \quad \therefore x = y + 1 \quad (1)$
 $, x^2 + y^2 = 25 \quad (2)$

Substituting from (1) in (2) : $\therefore (y+1)^2 + y^2 = 25$

$$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$$

$$\therefore 2y^2 + 2y - 24 = 0$$

$$\therefore y^2 + y - 12 = 0 \quad \therefore (y+4)(y-3) = 0$$

$$\therefore y = -4 \quad \text{or} \quad y = 3$$

Substituting in (1) : $\therefore x = -3 \quad \text{or} \quad x = 4$

$$\therefore \text{The S.S.} = \{(-3, -4), (4, 3)\}$$

[b] 1 $\because n(x) = \frac{x(x-2)}{(x-2)(x-3)}$

$$\therefore n^{-1}(x) = \frac{(x-2)(x-3)}{x(x-2)}$$

 $\therefore \text{The domain of } n^{-1} = \mathbb{R} - \{0, 2, 3\}$

$$, n^{-1}(x) = \frac{x-3}{x}$$

2 $\because n^{-1}(x) = 2 \quad \therefore \frac{x-3}{x} = 2$

$$\therefore x - 3 = 2x \quad \therefore x = -3$$

5

[a] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x+3)} \times \frac{x+3}{x^2+2x+4}$

 $\therefore \text{The domain of } n = \mathbb{R} - \{2, -3\}$

$$, n(x) = 1$$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$

Matrouh

1

- 1 a 2 c 3 a 4 b 5 c 6 d

2

[a] $\because x + \frac{1}{x} + 3 = 0 \quad (\text{Multiplying by } x)$
 $\therefore x^2 + 1 + 3x = 0 \quad \therefore x^2 + 3x + 1 = 0$
 $\therefore a = 1, b = 3, c = 1$
 $\therefore x = \frac{-3 \pm \sqrt{(3)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{-3 \pm \sqrt{5}}{2}$
 $\therefore x \approx -0.38 \quad \text{or} \quad x \approx -2.62$
 $\text{The S.S.} = \{-0.38, -2.62\}$

[b] $\because n(x) = \frac{(x-1)(x+1)}{x(x-1)}$
 $\therefore \text{The domain of } n = \mathbb{R} - \{0, 1\}$
 $, n(x) = \frac{x+1}{x}$

3

[a] $\because n(x) = \frac{x-1}{(x-1)(x+1)} \div \frac{x(x-5)}{(x+1)(x-5)}$
 $\therefore \text{The domain of } n = \mathbb{R} - \{1, -1, 5, 0\}$
 $, n(x) = \frac{x-1}{(x-1)(x+1)} \times \frac{(x+1)(x-5)}{x(x-5)} = \frac{1}{x}$

[b] Let the two positive numbers be x and y

$$\therefore x + y = 9 \quad \therefore y = 9 - x \quad (1)$$

$$, x^2 - y^2 = 27 \quad (2)$$

substituting from (1) in (2) :

Algebra and Probability

$$\begin{aligned} \therefore x^2 - (9-x)^2 &= 27 \\ \therefore x^2 - (81 + 18x - x^2) &= 27 \\ \therefore x^2 - 81 + 18x - x^2 &= 27 \\ \therefore 18x &= 108 \quad \therefore x = 6 \\ \text{Substituting in (1)} : \therefore y &= 3 \\ \therefore \text{The two positive numbers are : } &6, 3 \end{aligned}$$

4

[a] ① $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.3 + 0.6 - 0.2 = 0.7$

② $P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$
 $\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\}$

$$\left. \begin{array}{l} , n_1(x) = \frac{1}{x-1} \\ , \because n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)} = \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)} \end{array} \right\} (1)$$

$$\left. \begin{array}{l} \therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 1\} \\ , n_2(x) = \frac{1}{x-1} \end{array} \right\} (2)$$

From (1) and (2) : $\therefore n_1 = n_2$

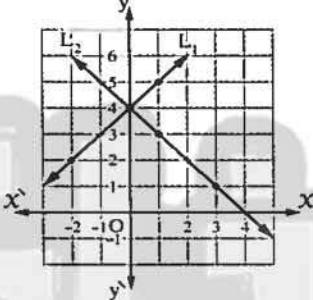
5

$$\begin{aligned} [a] \because n(x) &= \frac{3x}{(x+1)(x-2)} - \frac{x-1}{x^2-1} \\ &= \frac{3x}{(x+1)(x-2)} - \frac{x-1}{(x-1)(x+1)} \\ \therefore \text{The domain of } n &= \mathbb{R} - \{-1, 2, 1\} \\ , n(x) &= \frac{3x}{(x+1)(x-2)} - \frac{1}{x+1} \\ &= \frac{3x - (x-2)}{(x+1)(x-2)} = \frac{3x - x + 2}{(x+1)(x-2)} \\ &= \frac{2x + 2}{(x+1)(x-2)} = \frac{2(x+1)}{(x+1)(x-2)} = \frac{2}{x-2} \end{aligned}$$

[b] $y = x + 4 \quad x = 4 - y$

x	1	0	-2
y	5	4	2

x	3	1	0
y	1	3	4



From the graph : The S.S. = {(0, 4)}

RaNiya Sayed

Governorates' Examinations

1

Giza Governorate



Answer the following questions :

[1] Choose the correct answer :

(1) The set of zeroes of the function $f : f(X) = -3X$ is

- (a) $\{0\}$ (b) $\{3\}$ (c) $\{-3\}$ (d) $\mathbb{R} - \{3\}$

(2) If $A \subset S$ of a random experiment , $P(A) = P(\bar{A})$, then $P(A) =$

- (a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{8}$

(3) If X is a negative number , then the greatest number of the following is

- (a) $5X$ (b) $\frac{5}{X}$ (c) $5+X$ (d) $5-X$

(4) The domain of the function $f : f(X) = \frac{X-3}{4}$ is

- (a) \mathbb{R} (b) $\mathbb{R} - \{-4\}$ (c) $\mathbb{R} - \{-4, 3\}$ (d) \emptyset

(5) If the sum of ages of a father and his son now is 47 years , then the sum of their ages after 10 years = years.

- (a) 27 (b) 37 (c) 57 (d) 67

(6) If the two equations $X + 2y = 1$, $2X + ky = 2$ has only one solution , then $k \neq$

- (a) 1 (b) 2 (c) 4 (d) -4

[2] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations algebraically :

$$X + 3y = 7 \quad , \quad 5X - y = 3$$

[b] Find $n(X)$ in its simplest form , showing the domain of n :

$$n(X) = \frac{x^2 + x}{x^2 - 1} - \frac{x + 5}{x^2 + 4x - 5}$$

[3] [a] Find in \mathbb{R} the solution set of the following equation by using the general rule :

$$X^2 - 4X + 1 = 0 \text{ rounding the results to two decimal places.}$$

$$[b] \text{ If } n_1(X) = \frac{2X}{2X+6} \quad , \quad n_2(X) = \frac{x^2 + 3x}{x^2 + 6x + 9} \text{ , then prove that : } n_1 = n_2$$

[4] [a] If A and B are two events from a sample space of a random experiment , and
 $P(A) = 0.7$, $P(B) = 0.6$, $P(A \cap B) = 0.4$, then find :

- $$(1) P(A \cup B) \quad (2) P(A - B)$$

[b] Find $n(X)$ in its simplest form , showing the domain of n :

$$n(x) = \frac{x^3 - 8}{x^2 - 3x + 2} \times \frac{x+1}{x^2 + 2x + 4}$$

5 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations :

$$x - y = 1 \quad , \quad x^2 - y^2 = 25$$

$$[b] \text{ If } n(x) = \frac{x^2 - 3x}{(x-3)(x^2 + 2)}$$

, then find : $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}



2 Alexandria Governorate

Answer the following questions :

1 Choose the correct answer from those given ones :

(1) If A , B are two mutually exclusive events , $P(B) = 0.5$ and $P(A \cup B) = 0.7$, then $P(A) = \dots$

$$(2) (\chi + 1)^2 = \dots$$

- (a) $\chi^2 + 1$ (b) $\chi^2 - 1$ (c) $\chi^2 - \chi + 1$ (d) $\chi^2 + 2\chi + 1$

(3) The additive inverse of the fraction $\frac{3}{x^2 + 1}$ is

- (a) $\frac{-3}{x^2 + 1}$ (b) $\frac{x^2 + 1}{3}$ (c) $\frac{x^2 + 1}{-3}$ (d) $\frac{3}{x^2 - 1}$

(4) If X is a negative real number , then the greatest number of the following numbers is

- (a) $3 + \chi$ (b) 3χ (c) $3 - \chi$ (d) $\frac{3}{\chi}$

(5) If $X = 2$ and $y = 3$, then $(y - 2X)^{10} = \dots$

(6) The point of intersection of the two straight lines $x = 2$ and $x + y = 6$ is

- (a) (2 , 6) (b) (2 , 4) (c) (4 , 2) (d) (6 , 2)

2 [a] If A and B are two events of the sample space (S) of a random experiment such that :

$$P(A) = 0.7 , P(A \cap B) = 0.3 \text{ Find : } P(A - B)$$

[b] Find $n(x)$ in the simplest form showing the domain of n , where :

$$n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} - \frac{9 - x^2}{x^2 + x - 6}$$

3 [a] Find the common domain of n_1, n_2 to be equal such that :

$$n_1(x) = \frac{x^2 + 3x + 2}{x^2 - 4} , n_2(x) = \frac{x^2 - 1}{x^2 - 3x + 2}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x + y = 7$, $x^2 + y^2 = 25$

4 [a] Find $n(x)$ in the simplest form showing the domain of n , where :

$$n(x) = \frac{x}{x-2} \div \frac{x+3}{x^2-x-2}$$

[b] Find in \mathbb{R} the solution set of the equation : $3x^2 - 5x - 4 = 0$

, by using the general rule , rounding the result to two decimal places.

5 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations graphically :

$$x + y = 4 , 2x - y = 2$$

[b] If set of zeroes of the function $f : f(x) = ax^2 + x + b$ is $\{0, 1\}$

find the value of each two constants a and b

3

El-Kalyoubia Governorate



Answer the following questions :

1 Choose the correct answer :

(1) Twice the number X subtracted by 3 is

- (a) $X - 3$ (b) $2X + 3$ (c) $2X - 3$ (d) $3 - 2X$

(2) The domain of the function f where $f(x) = \frac{x+2}{5x}$ is

- (a) $\mathbb{R} - \{5\}$ (b) $\mathbb{R} - \{-5\}$ (c) \mathbb{R} (d) $\mathbb{R} - \{\text{zero}\}$

(3) If $P(A) = 4P(\bar{A})$, then $P(A) =$

- (a) 0.8 (b) 0.6 (c) 0.4 (d) 0.2

(4) If X is a negative number , then the greatest number of the following is

- (a) $5 - X$ (b) $5 + X$ (c) $\frac{5}{X}$ (d) $5X$

(5) If $2^7 \times 3^7 = 6^k$, then $k = \dots$

- (a) 14 (b) 7 (c) 6 (d) 5

(6) If $x^2 - y^2 = 2(x + y)$ where $(x + y) \neq$ zero, then $(x - y) = \dots$

- (a) 2 (b) 4 (c) 6 (d) 8

[2] [a] If $n(x) = \frac{x^3 - 8}{x^2 - x - 2} \div \frac{x^2 + 2x + 4}{2x^2 - x - 3}$

Find $n(x)$ in its simplest form showing the domain of n **[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$2x = 1 - y, x + 2y = 5$ in $\mathbb{R} \times \mathbb{R}$

[3] [a] If A, B are two events in a random experiment, $P(A) = 0.7$, $P(B) = 0.6$

and $P(A \cap B) = 0.4$

Find : (1) $P(A \cup B)$ (2) $P(A - B)$ **[b] Find the solution set of the two equations :** $y - x = 3, x^2 + y^2 - xy = 13$ in \mathbb{R}^2

[4] [a] If $n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{x - 5}{x^2 - 6x + 5}$ Find $n(x)$ in its simplest form, showing the domain of n

[b] By using the formula, find in \mathbb{R} the solution set of the equation : $x^2 - 2x - 6 = 0$

(Approximate to the nearest one decimal)

[5] [a] If $n_1(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}, n_2(x) = \frac{2x}{2x + 4}$, prove that : $n_1 = n_2$

[b] If $n(x) = \frac{x - 2}{x + 1}$

Find : (1) The domain of n^{-1} (2) $n^{-1}(3)$ **4 El-Sharkia Governorate****Answer the following questions : (Calculator is allowed)****[1] Choose the correct answer from those given :**

(1) In the experiment of rolling a regular die once, the probability of appearance of an even number on the upper face =

- (a)
- $\frac{1}{6}$
- (b)
- $\frac{1}{3}$
- (c)
- $\frac{1}{2}$
- (d)
- $\frac{5}{6}$

(2) The set of zeroes of the function $f : f(X) = X^2 + 1$ is

- (a) $\{1\}$ (b) $\{-1\}$ (c) $\{-1, 1\}$ (d) \emptyset

(3) The point of intersection of the two straight lines $X + 2 = 0$ and $y - 3 = 0$ is

- (a) $(-2, -3)$ (b) $(-2, 3)$ (c) $(2, -3)$ (d) $(2, 3)$

(4) If $2^5 \times 3^5 = m \times 6^4$, then $m =$

- (a) 1 (b) 2 (c) 3 (d) 6

(5) The domain of the multiplicative inverse of the algebraic fraction $\frac{X+2}{X+5}$ is

- (a) \mathbb{R} (b) $\mathbb{R} - \{-5\}$ (c) $\mathbb{R} - \{-2\}$ (d) $\mathbb{R} - \{-2, -5\}$

(6) If $(7^{a-2}, 3) = (1, b+5)$, then $a+b =$

- (a) -1 (b) zero (c) 1 (d) 2

[2] [a] By using the general rule solve in \mathbb{R} the equation : $X(X-1) = 4$ taking $\sqrt{17} \approx 4.12$

[b] If A and B are two events in a sample space for a random experiment , and if

$$P(A) = 0.8, P(B) = 0.7 \text{ and } P(A \cap B) = 0.6$$

Find : (1) The probability of non occurrence of the event A

(2) The probability of occurrence one of the two events at least.

[3] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $X - y = 4$, $3X + 2y = 7$

[b] If $n_1(X) = \frac{x^2 - 3x + 9}{x^3 + 27}$, $n_2(X) = \frac{2}{2x + 6}$ **Prove that :** $n_1 = n_2$

[4] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $X - y = 1$, $X^2 - y^2 = 5$

[b] Find $n(X)$ in the simplest form showing the domain :

$$n(X) = \frac{x^2 + 2x + 4}{x^3 - 8} - \frac{9 - x^2}{x^2 + x - 6} \text{ and find : } n(58)$$

[5] [a] If $n(X) = \frac{x^3 - x}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x}$

Find : $n(X)$ in the simplest form showing the domain.

[b] If the set of zeroes of the function f where $f(X) = \frac{ax^2 - 6x + 8}{bx - 4}$ is $\{4\}$ and its domain is $\mathbb{R} - \{2\}$, then find : a , b

5 El-Monofia Governorate


Answer the following questions :

[1] Choose the correct answer :

- (1) If $a < \sqrt{3} < b$, then (a, b) is
 (a) $(0, 1)$ (b) $(2.5, 3.5)$ (c) $(1, 2)$ (d) $(2, 3)$
- (2) If the curve of the quadratic function does not intersect the X -axis at any point, then the number of solutions of the equation $f(X) = 0$ in \mathbb{R} is
 (a) zero (b) one solution. (c) two solutions. (d) an infinite number.
- (3) If $2^8 \times 3^8 = X \times 6^8$, then $X =$
 (a) 2 (b) 3 (c) 6 (d) 1
- (4) The set of zeroes of the function $f : f(X) = \frac{x^2 - 9}{x - 3}$ is
 (a) $\{3\}$ (b) $\{-3\}$ (c) $\{3, -3\}$ (d) \emptyset
- (5) If $f(X) = 6X^2 + 3X(1 - 2X)$ is a polynomial function, then its degree is
 (a) first. (b) second. (c) third. (d) fourth.
- (6) If A and B are two mutually exclusive events of random experiment then :
 $P(A \cap B) =$
 (a) $P(A \cup B)$ (b) $P(A) + P(B)$ (c) \emptyset (d) zero

[2] [a] If $(2a + b, 3) = (18, a - b)$:

Find the value of a and b (Indicating the steps of the solution).

[b] By using the general formula , find in \mathbb{R} the solution set for the following equation :

$$(X - 4)(X - 2) = 1 \text{ (knowing that : } \sqrt{2} \approx 1.41)$$

[3] [a] If the domain of the function n where : $n(X) = \frac{4}{X+a} + \frac{b}{2X}$

is $\mathbb{R} - \{0, -5\}$ and $n(3) = 1$, find the values of a and b

[b] Find $n(X)$ in the simplest form showing the domain where :

$$n(X) = \frac{x^2 + 4x + 3}{x - 1} \div \frac{x^2 + 3x}{x^2 - x}$$

[4] [a] Find $n(X)$ in the simplest form showing the domain where :

$$n(X) = \frac{x^2 + x + 1}{x^4 - x} + \frac{x + 3}{3 - 2x - x^2} \text{ and if } n(a) = -2, \text{ find the value of a}$$

[b] A right angled triangle in which the length of one of the sides of right angled is 5 cm. and its perimeter is 30 cm. Find the area of the triangle.
(Indicating the steps of the solution).

[5] [a] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^3 - x^2 - 6x}{x^3 - 9x}$

Prove that : $n_1(x) = n_2(x)$ for all values of x which belong to the common domain and find this domain.

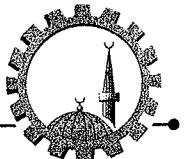
[b] If A and B are two events of the sample space of a random experiment

$$P(A) = \frac{5}{9}, \quad P(B) = \frac{2}{9}, \quad P(A \cap B) = \frac{1}{9}$$

Find : (1) $P(A \cup B)$

- (2) The probability of non occurrence any of the two events.
(3) The probability of occurrence of event A only.

6 El-Gharbia Governorate



Answer the following questions :

1 Choose the correct answer from those given :

- (1) If the solution set of the equation $x^2 - ax + 4 = 0$ is $\{-2\}$, then $a = \dots$

(a) -2 (b) -4 (c) 2 (d) 4

(2) If $n(x) = \frac{x+2}{x-5}$, then the domain of n^{-1} is \dots

(a) $\{2, -5\}$ (b) $\{-2, 5\}$ (c) $\mathbb{R} - \{-2, 5\}$ (d) $\mathbb{R} - \{2, -5\}$

(3) If A and B are two mutually exclusive events of a random experiment
, if $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$, then $P(B) = \dots$

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) 1

(4) The set of zeroes of the function $f : f(x) = \frac{x^2 - x - 2}{x^2 + 4}$ is \dots

(a) $\{2, -2\}$ (b) $\{-2, -1\}$ (c) $\{2, -1\}$ (d) $\{1, -1\}$

(5) The point of intersection of the two straight lines : $y = 2$, $x + y = 6$ is \dots

(a) (4, 2) (b) (2, 4) (c) (2, 2) (d) (4, 4)

(6) If the curve of the function $f : f(x) = x^2 - x + c$ passing through the point (2, 1),
then $c = \dots$

(a) 2 (b) 1 (c) -2 (d) -1

[2] [a] Find in \mathbb{R} the solution set of the following equation , using the general rule , rounding the results to two decimal places : $X(X - 1) = 4$

[b] Find : $n(X) = \frac{X^3 - 8}{X^2 + X - 6} \times \frac{X + 3}{X^2 + 2X + 4}$ in the simplest form showing the domain.

[3] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $y - X = 2$ and $X^2 + XY - 4 = 0$

[b] Find $n(X)$ in the simplest form , showing the domain where : $n(X) = \frac{3}{X+1} + \frac{2X+1}{1-X^2}$

[4] [a] Draw the graphical representation of the function $f(X) = X^2 - 2X - 3$ in the interval $[-2, 4]$ and from the drawing , find the solution set of the equation $X^2 - 2X - 3 = 0$

[b] Find $n(X)$ in the simplest form , showing the domain of n where :

$$n(X) = \frac{X^2 - 2X + 1}{X^3 - 1} \div \frac{X - 1}{X^2 + X + 1}$$

[5] [a] If $n(X) = \frac{X^2 - 2X}{(X - 2)(X^2 + 2)}$

(1) Find $n^{-1}(X)$ in the simplest form and determine the domain of n^{-1}

(2) If $n^{-1}(X) = 3$ what is the value of X ?

[b] If A and B are two events in the sample space of a random experiment and if

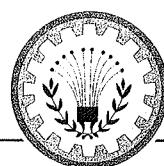
$$P(A) = 0.7, P(B) = 0.6 \text{ and } P(A \cap B) = 0.4$$

Find : (1) $P(A \cup B)$

(2) Probability occurrence of one event without the other.

7

El-Dakahlia Governorate



Answer the following questions : (Calculators are permitted)

[1] [a] Choose the correct answer from the given answers :

(1) The point of intersection of the two straight lines : $X + 2 = 0$ and $y = X$ is

- (a) (2, 2) (b) (2, 0) (c) (-2, -2) (d) (0, 0)

(2) If $n(X) = \frac{X+1}{X-2}$ is an algebraic fraction , then the domain in which the fraction has multiplicative inverse is

- (a) $\mathbb{R} - \{-2\}$ (b) $\mathbb{R} - \{-1, 2\}$ (c) $\mathbb{R} - \{-1\}$ (d) $\{-1, 2\}$

(3) If there is only one solution for the equation :

$x + 2y = 1$ and $2x + ky = 2$ in $\mathbb{R} \times \mathbb{R}$, then k cannot equal

(a) 2

(b) 4

(c) -2

(d) -4

[b] Find in \mathbb{R} the solution set of the equation $x(x-3) = -1$, using the general formula (approximating the results to the nearest tenth)

2 [a] Choose the correct answer from the given answers :

(1) If the curve of the quadratic function f passes through the points $(2, 0)$, $(-3, 0)$ and $(0, -6)$, then the solution set of the equation $f(x) = 0$ in \mathbb{R} is

(a) $\{-2, 3\}$ (b) $\{3, 2\}$ (c) $\{2, -3\}$ (d) $\{-3, -6\}$

(2) The simplest form of the function $n : n(x) = \frac{3-x}{x-3}$ such that $x \in \mathbb{R} - \{3\}$ is

(a) 1 (b) -1 (c) 3 (d) -3

(3) If A is an event of random experiment, then $P(\bar{A}) =$

(a) 1 (b) -1 (c) $1 - P(A)$ (d) $P(A) - 1$

[b] If $(a, 2b)$ is a solution for the equations $3x - y = 5$ and $x + y = -1$, find the value of a and b

3 [a] n_1, n_2 are two algebraic fractions such that : $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$ and $n_2(x) = \frac{x^2 - x - 6}{x^2 - 9}$

Prove that : $n_1(x) = n_2(x)$ for all values of x which belong to the common domain and find this domain.

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of pair of equations : $x + y = 3$ and $x^2 + xy = 6$

4 [a] If $n(x) = \frac{x^2 + 3x}{x^2 + 2x - 3} - \frac{x-2}{x^2 - 3x + 2}$

Find $n(x)$ in simplest form showing the domain of n .

[b] Find $n(x)$ in simplest form showing the domain of n , such that :

$n(x) = \frac{x^3 - x^2 - 2x}{x^2 - 5x + 6} \times \frac{x^2 + 2x - 15}{x^3 + 6x^2 + 5x}$, then find $n(7), n(3)$ if possible.

5 [a] If $f_1(x) = \frac{x-a}{x+b}$, and the set of zeroes of f_1 is $\{5\}$, and the domain of f_1 is $\mathbb{R} - \{3\}$,

then find the values of a and b

If $f_2(x) = \frac{x-1}{x-3}$, then find $f_1(x) + f_2(x)$ in the simplest form.

[b] If A and B are two events in a sample space of a random experiment and

$P(A) = 0.7$, $P(B) = 0.6$ and $P(A \cap B) = 0.4$, then find :

- (1) $P(A \cup B)$
- (2) The probability of occurrence of one of the two events but not the other.

8**Ismailia Governorate**

Answer the following questions : (Calculators are permitted)

1 Choose the correct answer from those given answers :

- (1) If the age of a man now is X year , then his age after 5 years from now is years.
 (a) $X - 5$ (b) $5 - X$ (c) $5X$ (d) $X + 5$
- (2) The set of zero is of f where $f(X) = X(X^2 - 2X + 1)$ is
 (a) $\{0, 1\}$ (b) $\{0, -1\}$ (c) $\{-1, 1\}$ (d) $\{0, 1, -1\}$
- (3) If $(5, X - 4) = (y, 3)$, then $X + y =$
 (a) 25 (b) 12 (c) 8 (d) 6
- (4) Number of solutions of the two equations : $X + y = 2$, $y - 3 = 0$ together is
 (a) 3 (b) 2 (c) 1 (d) zero
- (5) If A and B are two mutually exclusive events , then $P(A - B) =$
 (a) zero (b) $P(A)$ (c) $P(B)$ (d) $P(A \cup B)$
- (6) If the curve of the function f where $f(X) = X^2 - a$ passes through the point $(1, 0)$, then $a =$
 (a) -2 (b) -1 (c) zero (d) 1

2 [a] Find the solution set of the following equation in \mathbb{R} :

$$X(X - 2) = 4 \quad (\text{knowing that} : \sqrt{5} \approx 2.2)$$

[b] If $n(X) = \frac{X^2 - 2X}{X^2 - 5X + 6}$

Find : $n^{-1}(X)$ in the simplest form showing the domain of n^{-1}

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations (algebraically) :

$$X + y = 5 \quad , \quad X^2 + XY = 15$$

[b] Find $n(X)$ in the simplest form where : $n(X) = \frac{X}{X-4} - \frac{4X+16}{X^2-16}$

- [4]** [a] A classroom consists of 40 students , 30 of them succeeded in math. 24 in science and 20 in both math. and science. If a student is chosen randomly.

Find the probability that this student is :

- (1) fail in math. (2) succeeded in math. or science

- [b] Find $n(x)$ in the simplest form showing the domain of n :**

$$n(x) = \frac{x^2 - x - 2}{x^2 - 1} \div \frac{x - 5}{x^2 - 6x + 5}$$

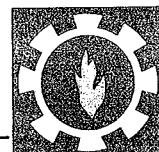
- [5]** [a] Find $n(x)$ in the simplest form where : $n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} + \frac{1}{x + 2}$

- [b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations (graphically) :**

$$y = 3x - 1 , \quad x - y + 1 = \text{zero}$$

9

Suez Governorate



Answer the following questions : (Calculators are permitted)

- [1] Choose the correct answer from those given :**

(1) The set of zeroes of f where $f(x) = (x - 1)^2(x + 2)$ is

- (a) $\{1, -2\}$ (b) $\{-1, 2\}$ (c) $\{-1, -2\}$ (d) $\{1, 2\}$

(2) If $x - y = 2$, $x^2 - y^2 = 10$, then $x + y =$

- (a) -5 (b) 2 (c) -2 (d) 5

(3) If $A \subset S$ of a random experiment , $P(A) = P(\bar{A})$, then $P(A) =$

- (a) zero (b) 1 (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

(4) If x is a negative number , then the greatest number is

- (a) $3 + x$ (b) $3 - x$ (c) $3x$ (d) $\frac{3}{x}$

(5) If $x = 3$ belongs to the solution set of the equation : $x^2 - ax - 6 = 0$, then $a =$

- (a) 3 (b) 2 (c) 1 (d) -1

(6) The function f where $f(x) = \frac{x-3}{x-4}$ has additive inverse in the domain

- (a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{4\}$ (c) $\mathbb{R} - \{-4\}$ (d) $\mathbb{R} - \{-3\}$

[2] [a] Find the solution set in $\mathbb{R} \times \mathbb{R}$: $2x - y = 7$, $3x + y = 8$

(Explain your answer showing the steps solution)

[b] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x}{x+1} + \frac{x^2}{x^3+x^2}, \text{ then calculate } n(3)$$

[3] [a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$$x - 1 = 0 , x^2 + y^2 = 10$$

[b] If the fraction $\frac{x+2}{x^2-4}$ is the multiplicative inverse of $\frac{x-2}{h}$ where $x \notin \{2, -2\}$,

then calculate h

[4] [a] Find in \mathbb{R} the solution set for the following equations by using the formula in :

$$x^2 - 3x + 1 = 0, \text{ knowing that } \sqrt{5} = 2.24$$

[b] If $n_1(x) = \frac{3x}{3x+3}$, $n_2(x) = \frac{x^2+x}{x^2+2x+1}$ Prove that : $n_1 = n_2$

[5] [a] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2+2x+1}{2x-8} - \frac{x-4}{x+1}$$

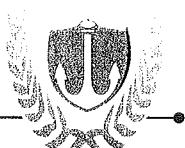
[b] If A and B are two events from the sample of a random experiment and

$$P(A) = 0.6 , P(B) = 0.3 , P(A \cap B) = 0.5$$

$$\text{Find : (1) } P(A \cup B) \quad (2) P(\bar{B})$$

10

Port Said Governorate



Answer the following questions :

[1] Choose the correct answer from those given :

(1) If the two equations : $x + 3y = 4$, $x + ay = 7$ represent two parallel straight lines , then $a = \dots$

- (a) $-\frac{1}{3}$ (b) -3 (c) 3 (d) 1

(2) The domain of the multiplicative inverse of the fraction : $\frac{x-2}{x^3+27}$ is

- (a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{-3, 2\}$ (c) $\mathbb{R} - \{2, -3, 3\}$ (d) $\mathbb{R} - \{3, -3\}$

(3) If $x^2 - y^2 = 2(x+y)$ such that : $x+y \neq 0$, then $x-y = \dots$

- (a) 2 (b) 4 (c) 6 (d) 8

(4) If a die is tossed once, then the probability of appearance of an odd number equals

- (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) 1 (d) 3

(5) The degree of the equation : $3x + 4y + xy = 5$ is

- (a) zero. (b) first. (c) second. (d) third.

(6) If $2x = 1$, then $\frac{1}{5}x = \dots$

- (a) $\frac{2}{5}$ (b) $\frac{1}{5}$ (c) $\frac{1}{2}$ (d) $\frac{1}{10}$

[2] [a] Solve in \mathbb{R} the equation : $2x(x-5) = 1$ approximate to the nearest one decimal.

[b] Find the common domain of $n_1(x)$, $n_2(x)$ to be equal such that :

$$n_1(x) = \frac{x^2 + 9x + 20}{x^2 - 16}, \quad n_2(x) = \frac{x^2 + 5x}{x^2 - 4x}$$

[3] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - 2y = 0, \quad x^2 - y^2 = 3$$

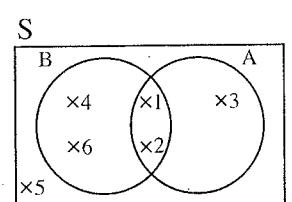
$$[b] \text{ If } n(x) = \frac{x+3}{x^2 + 5x - 14} \div \frac{x^2 + 3x}{2x + 14}$$

Find : $n(x)$ in its simplest form, showing the domain of n

[4] [a] Find n in its simplest form, showing its domain where : $n(x) = \frac{x^2 + x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$

[b] Use the opposite Venn diagram to calculate the probability of :

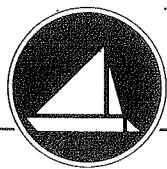
- (1) Non occurrence of the event A
- (2) The occurrence of the event B only.
- (3) Occurrence of A or B



[5] [a] If $n(x) = \frac{x^2 - 2x}{(x-2)(x+2)}$

- (1) Find : $n^{-1}(x)$ (2) If $n^{-1}(x) = 3$ what is the value of x ?

[b] Two numbers, if three times a number is added to twice a second number the sum is 13 and if the first number is added to three times the second number the sum is 16, find the two numbers.

11 Damietta Governorate


Answer the following questions : (Calculators are permitted)

[1] Choose the correct answer from the given ones :

(1) The solution set of the equation : $a X^2 + b X + c = 0$, $a \neq 0$ graphically is the set of X coordinates of the points of intersection of the curve of the function $f : f(X) = a X^2 + b X + c$ with the

- (a) y-axis (b) X -axis (c) symmetric line (d) straight line $y = 2$

(2) If $a b = 12$, $b c = 20$, $a c = 15$, $a \in \mathbb{R}^+$, $b \in \mathbb{R}^+$, $c \in \mathbb{R}^+$, then $a b c = \dots$

- (a) 360 (b) 3600 (c) 60 (d) 36

(3) If the algebraic fraction $\frac{X-a}{X+5}$ have a multiplicative inverse which is $\frac{X+5}{X+3}$, then $a = \dots$

- (a) 3 (b) -5 (c) -3 (d) 5

(4) $\sqrt{(-2)^4 + 3^2} = \dots + 3$

- (a) 2^2 (b) 2 (c) -2 (d) $(-2)^2$

(5) If $P(A) = P(\bar{A})$, then $P(A) = \dots$

- (a) $\frac{1}{2}$ (b) 1 (c) $\frac{3}{4}$ (d) 0

(6) $X^3 - 1 = \dots$

- (a) $(X^2 - 1)(X + 1)$ (b) $(X - 1)(X^2 + 2X + 1)$
 (c) $(X - 1)(X^2 + X + 1)$ (d) $(X - 1)(X^2 - 2X - 1)$

[2] [a] Find : $n(X) = \frac{X-3}{X^2-7X+12} - \frac{4}{X^2-4X}$ in the simplest form showing the domain of n

[b] Find the value of a and b , knowing that : $\{(3, -1)\}$ is the solution set of the two equations : $aX + bY - 5 = 0$, $3aX + bY = 17$

[3] [a] Find in \mathbb{R} the solution set for the equation $X(X - 1) = 4$ using the general rule to the nearest hundredth.

[b] Find the common domain of f_1 , f_2 to be equal such that :

$$f_1(X) = \frac{X^2 + X - 12}{X^2 + 5X + 4} , \quad f_2(X) = \frac{X^2 - 2X - 3}{X^2 + 2X + 1}$$

- [4] [a]** Two acute angles in a right-angled triangle the difference between their measures is 50° .
Find the measure of each angle.

[b] Find $n(x)$ in the simplest form showing the domain :

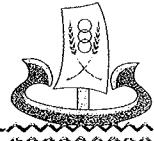
$$n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 15}{x^2 - 4x - 5}$$

- [5] [a]** If A and B are two events from a sample space of a random experiment and

$$P(A) = 0.4, P(B) = 0.5, P(A \cup B) = 0.7$$

Find : (1) $P(A \cap B)$ (2) $P(B - A)$

- [b]** If $n(x) = \frac{x + \frac{1}{x}}{4x + \frac{4}{x}}$ Find $n(x)$ in the simplest form showing the domain.



12 Kafr El-Sheikh Governorate

Answer the following questions : (Calculator is allowed)

- [1] [a] Choose the correct answer from those given :**

(1) If $x = y + 1$, $(x - y)^2 + y = 3$, then $y = \dots \dots \dots$

- (a) zero (b) 1 (c) 2 (d) 3

(2) If $a b = 3$, $a b^2 = 12$, then $b = \dots \dots \dots$

- (a) 4 (b) 2 (c) -2 (d) ± 2

(3) If $n(x) = \frac{x-1}{x-2}$, then the domain of $n^{-1} = \dots \dots \dots$

- (a) \mathbb{R} (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{2\}$ (d) $\mathbb{R} - \{1, 2\}$

[b] Solve in $\mathbb{R} \times \mathbb{R}$ the two simultaneous equations :

$$x - y = 1, x^2 + y^2 = 25$$

- [2] [a] Choose the correct answer from those given :**

(1) The probability of the impossible event equals

- (a) \emptyset (b) zero (c) 1 (d) -1

(2) If the solution set of the equation : $x^2 + m x + 9 = 0$ is $\{-3\}$, then $m = \dots \dots \dots$

- (a) 5 (b) 6 (c) ± 6 (d) zero

(3) If the two equations : $x + 3y = 6$, $2x + ky = 12$ have an infinite number of solution in $\mathbb{R} \times \mathbb{R}$, then $k = \dots \dots \dots$

- (a) 2 (b) 6 (c) 3 (d) 1

[b] Two acute angles in a right-angled triangle the difference between their measures is 50° . Find the measure of each angle.

[3] [a] Solve in \mathbb{R} using the (general rule) the equation : $3x^2 = 5x + 4$ approximating the result to the nearest two decimals.

[b] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{3}{x+1} + \frac{2x+1}{1-x^2}$$

4 [a] If A ,B are two events from a sample space of random experiment , and

$P(B) = \frac{1}{12}$, $P(A \cup B) = \frac{1}{3}$, then find $P(A)$ if :

(1) A and B are two mutually exclusive events.

(2) $B \subset A$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$ Prove that : $n_1 = n_2$

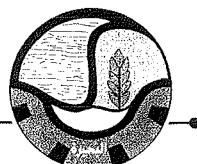
[5] [a] If $n(x) = \frac{x^2 - 5x}{(x-5)(x^2 + 1)}$

(1) Find $n^{-1}(x)$ and identify the domain of n^{-1}

(2) If $n^{-1}(x) = 2$, find the value of x

$$[b] \text{ If } n(x) = \frac{x^2 - 3x}{x^2 - 9} \div \frac{2x}{x+3}$$

Find $n(X)$ in the simplest form showing the domain of n



13 El-Beheira Governorate

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from the given ones :

(1) If $f(x) = 2x$, then $f(1) - f(-1) = \dots$

(2) The two straight lines : $x + 5y = 1$, $x + 5y - 8 = 0$ are

- (a) parallel. (b) coincide.
 (c) intersect and non perpendicular (d) perpendicular

(3) If $n(X^2) = 9$, then $n(X) = \dots$

Algebra and Statistics

- (4) If $n(x) = \frac{x-2}{x^2-x-6}$, then the domain of n^{-1} is
 (a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{-2, 3\}$ (c) $\mathbb{R} - \{-2, 2\}$ (d) $\mathbb{R} - \{-2, 2, 3\}$
- (5) The degree of the equation : $3x + 4y + xy = 5$ is
 (a) zero. (b) first. (c) second. (d) third.
- (6) A card is drawn randomly from 20 identical cards numbered from 1 to 20, then the probability that the number of the drawn card multiple of 7 is
 (a) 10 % (b) 15 % (c) 20 % (d) 25 %

[2] [a] Solve in \mathbb{R} the equation : $3x^2 = 5x + 4$ approximating the result to the nearest two decimals.

[b] Simplify the function $n(x)$ where :

$$n(x) = \frac{3x}{x^2 - 2x} - \frac{12}{x^2 - 4} \text{ showing the domain of } n$$

[3] [a] If $f(x) = \frac{x^2 - 9}{x + b}$, $f(4) = 1$ Find : b

[b] If A and B are two events in a random experiment

$$, P(A) = 0.7, P(B) = 0.6 \text{ and } P(A \cap B) = 0.4$$

Find the probability of :

(1) Non occurrence of the event A

(2) Occurrence of one of the events but not the other.

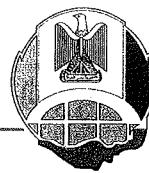
[4] [a] The sum of two rational numbers is 12, and three times the smallest number exceeds than twice the greatest number by one Find the two numbers.

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, then prove that : $n_1 = n_2$

[5] [a] Solve in $\mathbb{R} \times \mathbb{R}$ the two equations : $x - y = 1$, $x^2 + y^2 = 25$

[b] If $f(x) = \frac{x^2 - 49}{x^3 - 8} \div \frac{x+7}{x-2}$

Find : $f(x)$ in its simplest form showing the domain of f



14 El-Fayoum Governorate

Answer the following questions : (Calculators are permitted)

1 Choose the correct answer from the given ones :

$$(1) (2\sqrt{2})^4 = \dots$$

(2) If A and B are mutually exclusive events from the sample space of a random experiment , then $P(A \cap B) = \dots$

(3) If $X = 1$ is the solution of the equation : $X^2 + m X + 4 = 0$, then $m = \dots$

(4) If $2x^2 = 5$, then $6x^2 = \dots$

(5) If $n(x) = \frac{x}{x-1}$, then the domain of $n^{-1} = \dots$

- (a) $\mathbb{R} - \{0\}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{0, 1\}$ (d) $\mathbb{R} - \{-1\}$

(6) The sum of two consecutive integers is 17 , then the smaller number of them is

[2] [a] If $n(x) = \frac{x^2 + x}{x^2 - x - 2} - \frac{2x + 4}{x^2 - 4}$, find $n(x)$ in the simplest form showing the domain of n .

. [b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$y = x + 1 \quad , \quad x^2 + y^2 = 13$$

[3] [a] By using the general rule find in \mathbb{R} the solution set of the equation :

$x^2 - 5x + 3 = 0$, approximating the result to the nearest one decimal digit.

[b] Find $n(X)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \div \frac{x^2 + x + 1}{2x - 2}$$

4] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations graphically :

$$y = x + 1 \quad , \quad 2x + y = 7$$

[b] Find the set of zeroes of the function $f : f(x) = \frac{x-1}{x+1}$, then find $f^{-1}(2)$

- [5] [a]** Find the common domain of n_1 and n_2 to be equal such that :

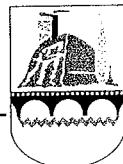
$$n_1(x) = \frac{x^2 + 2x}{x^2 + 3x + 2}, \quad n_2(x) = \frac{x^2 - x}{x^2 - 1}$$

[b] A bag contains 10 identical cards numbered from 1 to 10 , one card of them is drawn randomly , calculate the probability that the number on the drawn card is :

- (1) A prime number. (2) A number divisible by 5

15

Beni Suef Governorate



Answer the following questions : (Calculator is allowed)

- [1]** Choose the correct answer from those given :

(1) The probability of the impossible event equals

- (a) \emptyset (b) 1 (c) zero (d) -1

(2) If $2^x = 8$, then $x =$

- (a) zero (b) 1 (c) 2 (d) 3

(3) If the two straight lines which represent the two equations :

$x + 2y = 4$, $2x + ky = 11$ are parallel , then $k =$

- (a) 4 (b) 1 (c) -1 (d) -4

(4) If a is a negative number , then the greatest number is

- (a) $3+a$ (b) $3-a$ (c) $3a$ (d) $\frac{3}{a}$

(5) The solution set of the equation : $x^2 + 1 = 0$ in \mathbb{R} is

- (a) $\{1\}$ (b) $\{1, -1\}$ (c) $\{-1\}$ (d) \emptyset

(6) If $n(x) = \frac{x-1}{x+2}$, then $n^{-1}(1)$ is

- (a) -1 (b) zero (c) 3 (d) undefined.

- [2] [a]** Find the set of zeroes of the function $f : f(x) = x^3 - x$

- [b]** Find in \mathbb{R} the solution set of the following equation by using the general formula :

$x^2 - 5x + 3 = 0$ approximating the result to the nearest one decimal digit.

- [3] [a]** Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x + y = 4, \quad 2x - y = 2$$

- [b]** If A and B are two events from a sample space of a random experiment

, $P(A) = 0.6$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$

Find : (1) $P(A - B)$ (2) $P(A \cup B)$

[4] [a] If $n_1(x) = \frac{x^2 - 2x + 4}{x^3 + 8}$, $n_2(x) = \frac{3}{3x + 6}$

Prove that : $n_1 = n_2$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

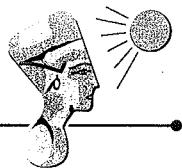
$$x - 2 = 0 \quad , \quad x^2 + xy + y^2 = 7$$

[5] [a] Find $n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 15}{x^2 - 4x - 5}$

in the simplest form showing the domain of n

[b] If the domain of the function $n : n(x) = \frac{x-1}{x^2 - 3x + 9}$ is $\mathbb{R} - \{3\}$

, then find the value of a



16

El-Menia Governorate

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

$$(1) (-1)^{37} - (-1)^{36} = \dots$$

(2) The degree of the function $f : f(x) = 2x^3 + 3x^2 - 5$ is.....

(3) If $a + b = 7$, $a^2 - b^2 = 21$, then $a - b = \dots$

(4) The simplest form of the function $f : f(x) = \frac{3-x}{x-3}$ where $x \neq 3$ is

(5) The number of solutions of the two equations :

$$x - \frac{1}{2}y = 4 \quad , \quad 2x - y = 1 \text{ in } \mathbb{R}^2 \text{ is } \dots$$

- (a) one solution . (b) two solutions.

- (c) an infinite number. (d) zero.

(6) If a die is tossed once , then the probability of appearance of a number greater than 4 is

- (a) $\frac{2}{3}$ (b) $\frac{1}{6}$ (c) $\frac{1}{3}$ (d) $\frac{1}{2}$

2] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of :

$$\chi + y = \text{zero} \quad , \quad 5y^2 - 4\chi^2 = 36$$

[b] Find $n(x)$ in the simplest form and determine the domain of n :

$$n(x) = \frac{x-3}{x^2 - 7x + 12} - \frac{4}{x^2 - 4x}$$

[3] [a] By using the general formula find in \mathbb{R} the S.S. of : $x^2 - x - 4 = 0$ where $\sqrt{17} \approx 4.12$

[b] If $n_1(x) = \frac{2x}{2x+4}$, $n_2(x) = \frac{x^2+2x}{x^2+4x+4}$ Prove that : $n_1 = n_2$

[4] [a] Find $n(x)$ in the simplest form showing the domain of n : $n(x) = \frac{x^2+2x+1}{2x-8} \times \frac{x-4}{x+1}$

[b] If $(-3, 1)$ is a solution for the two equations $aX+bY=5$, $3aX+bY=17=0$

Find : a, b

[5] [a] If the domain of n : $n(x) = \frac{\ell}{x} + \frac{9}{x+m}$ is $\mathbb{R} - \{0, -2\}$, $n(4) = 1$ Find : ℓ, m

[b] If S is the sample space of a random experiment where its outcomes are equal, A and B are two events from S , if the number of outcomes that leads to the occurrence of the event $A = 13$ and the number of all possible outcomes of the random experiment is 24 , $P(A \cup B) = \frac{5}{6}$ and $P(B) = \frac{5}{12}$

Find :

- (1) The probability of occurrence of the event A
- (2) The probability of occurrence of the events A and B together.



17

Assiut Governorate

Answer the following questions : (Calculator is allowed)

[1] Choose the correct answer :

(1) The solution set of the two equations : $X = -1$, $y - 1 = 0$ in $\mathbb{R} \times \mathbb{R}$ is

- (a) $\{(-1, 1)\}$
- (b) $\{(1, -1)\}$
- (c) $\{(-1, -1)\}$
- (d) $\{(1, 1)\}$

(2) The solution set of the equation : $2X + 4 = 0$ in \mathbb{N} is

- (a) $\{2\}$
- (b) $\{-2\}$
- (c) $\{0\}$
- (d) \emptyset

(3) The domain of the function f where $f(x) = \frac{x-2}{x^2+1}$ is

- (a) $\mathbb{R} - \{-1\}$
- (b) $\mathbb{R} - \{1, -1\}$
- (c) $\mathbb{R} - \{1\}$
- (d) \mathbb{R}

(4) If $A \subset S$, $P(A) = \frac{1}{3}$, then $P(\bar{A}) =$

- (a) $\frac{1}{3}$
- (b) $\frac{2}{3}$
- (c) $\frac{1}{2}$
- (d) $\frac{3}{2}$

(5) $|-5| =$

- (a) -5
- (b) $-\frac{1}{5}$
- (c) 5
- (d) $\frac{1}{2}$

(6) If A and B are two mutually exclusive events of a random experiment ,

then $P(A \cap B) = \dots$

(a) \emptyset

(b) 1

(c) zero

(d) $\frac{1}{2}$

[2] [a] Find algbarily the solution set of the two equations :

$$2x - y = 3 \quad , \quad x + 2y = 4$$

[b] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} + \frac{x^2 + x - 2}{x^2 - 4}$$

[3] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - y = 1 \quad , \quad x^2 + y^2 = 25$$

$$[b] \text{ If } n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 15}{x^2 - 4x - 5}$$

, find $n(x)$ in the simplest form showing the domain of n

[4] [a] Find in \mathbb{R} the solution set of the equation : $3x^2 - 5x - 1 = 0$

approximating the result to the nearest two decimals.

$$[b] \text{ If } n(x) = \frac{x^2 + 3x}{x^3 + 27} \text{ , find } n^{-1}(x) \text{ in its simplest form showing the domain of } n^{-1}$$

$$[5] \text{ [a] If } n_1(x) = \frac{x^2}{x^3 - x^2} \quad , \quad n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x} \text{ Prove that : } n_1 = n_2$$

[b] A bag contains 15 identical balls numbered from 1 to 15 , one ball is chosen randomly , if the event A is getting an odd number and the event B is getting a number divisible by 5

Find :

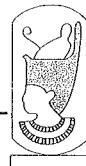
(1) $P(A)$

(2) $P(B)$

(3) $P(A - B)$

18

Souhag Governorate



Answer the following questions : (Calculator is allowed)

[1] Choose the correct answer :

(1) The set of zeroes of the function f where $f(x) = \frac{x-3}{x+2}$ is

(a) {zero}

(b) {3}

(c) {-2}

(d) {3, -2}

(2) If $2^n = 3$, then $8^n = \dots$

(a) 27

(b) 9

(c) 3

(d) 6

(3) If A and B are two mutually exclusive events of a random experiment

, then $P(A \cap B) = \dots$

- (a) \emptyset (b) 1 (c) 2 (d) zero

(4) If $3^x + 3^x + 3^x = 9$, then $x = \dots$

- (a) 4 (b) 2 (c) 1 (d) 9

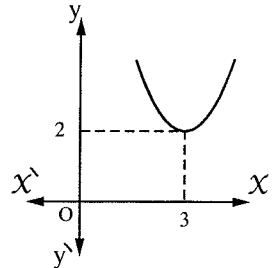
(5) If the two equations : $x + 3y = 6$, $2x + ky = 12$ have an infinite number of solutions , then $k = \dots$

- (a) 1 (b) 6 (c) 3 (d) 2

(6) In the opposite figure :

The solution set of $f : f(x) = 0$ is

- (a) \emptyset (b) $\{3\}$
 (c) $\{2, 3\}$ (d) $\{2\}$



[2] [a] Solve in \mathbb{R} the equation : $2x^2 - 5x + 1 = 0$ approximating the result to the nearest two decimals.

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, prove that : $n_1 = n_2$

[3] [a] Solve in $\mathbb{R} \times \mathbb{R}$ the two equations : $x - 2y = 1$, $x^2 - xy = 0$

[b] Find $n(x)$ in the simplest form showing the domain of n where : $n(x) = \frac{x}{x+1} + \frac{2x^2}{x^3 - x}$

[4] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$2x + y = 1, \quad x + 2y = 5$$

[b] If $n(x) = \frac{x^2 - 3x}{x^2 - 9} \div \frac{2x}{x+3}$, find $n(x)$ in its simplest form showing the domain of n

[5] [a] If $n(x) = \frac{x-2}{x+1}$,

Find : (1) $n^{-1}(x)$ showing the domain of n^{-1} (2) $n^{-1}(3)$

[b] If A and B are two events in a random experiment

$$, P(A) = 0.7, \quad P(B) = 0.6 \text{ and } P(A \cap B) = 0.4$$

Find : (1) $P(A \cup B)$ (2) $P(A - B)$

19

Qena Governorate



Answer the following questions : (Calculators are permitted)

1 Choose the correct answer :

[2] [a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$$2x - y = 3 \quad , \quad x + 2y = 4$$

[b] If $n_1(x) = \frac{2x}{2x+4}$, $n_2(x) = \frac{x^2+2x}{x^2+4x+4}$ Prove that : $n_1 = n_2$

[3] [a] Find in \mathbb{R} the solution set of the following equation by using the general rule :

$$3x^2 = 5x - 1 \quad (\text{Rounding the results to two decimal places})$$

[b] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2 + x + 1}{x} \times \frac{x^2 - x}{x^3 - 1}$$

[4] [a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$$x + y = 7 \quad , \quad xy = 12$$

[b] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{3x - 4}{x^2 - 5x + 6} + \frac{2x + 6}{x^2 + x - 6}$$

5 [a] If $n(x) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$

(1) Find $n^{-1}(x)$ and identify the domain.

(2) If $n^{-1}(x) = 3$ what is the value of x ?

[b] If A and B are two events from the sample space of a random experiment and $P(A) = 0.7$, $P(A \cap B) = 0.3$ Find : $P(A - B)$



20 Luxor Governorate

Answer the following questions :

1 Choose the correct answer :

(1) The set of zeroes of the function $f : f(x) = x^2 + 3$ is

- (a) $\{0\}$ (b) \emptyset (c) $\{3\}$ (d) $\{3, -3\}$

(2) $\sqrt{16+9} = 4 +$

- (a) 3 (b) 5 (c) 1 (d) 7

(3) If \bar{A} is the complement event of the event A in a sample space of a random experiment , then $P(A) + P(\bar{A}) =$

- (a) 2 (b) 1 (c) $\frac{1}{2}$ (d) 3

(4) If $3^x = 1$, then $x =$

- (a) 0 (b) $\frac{1}{3}$ (c) 1 (d) 3

(5) The point of intersection of the two straight lines : $y = 2$, $x + y = 6$ is

- (a) (2, 4) (b) (2, 6) (c) (6, 2) (d) (4, 2)

(6) If $(5, x-4) = (y+2, 3)$, then $x+y =$

- (a) 6 (b) 8 (c) 10 (d) 12

2 [a] Find the solution set of the two equations in \mathbb{R}^2 : $x - 2y = 0$, $x^2 - y^2 = 3$

[b] If $n(x) = \frac{x^2 - 16}{x + 4}$

Find : (1) $n^{-1}(x)$ showing the domain of n^{-1} (2) $n^{-1}(4)$ (3) $n(4)$

3 [a] If $n_1(x) = \frac{2x}{2x+4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$ Prove that : $n_1 = n_2$

[b] Using the general rule find in \mathbb{R} the S.S. of the equation :

$$3x^2 = 5x - 1 \quad (\text{given that } \sqrt{13} \approx 3.61)$$

4 [a] If A , B are two events of the sample space of a random experiment and if

$$P(B) = \frac{1}{12} , \quad P(A \cup B) = \frac{1}{3}$$

Find P (A) in the following cases :

(1) A and B are two mutually exclusive events

(2) $B \subset A$

$$[\mathbf{b}] \text{ If } n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{5 - x}{x^2 - 6x + 5}$$

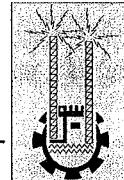
Find $n(x)$ in the simplest form showing the domain of n .

[5] [a] If $n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$

Find $n(x)$ in the simplest form showing the domain

[b] Find graphically in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations :

$$y = x + 4 \quad , \quad x + y = 4$$



21 Aswan Governorate

Answer the following questions : (Calculators are permitted)

1 Choose the correct answer from those given :

(1) If $x + y = 5$, then $3x + 3y = \dots$

[2] [a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of two equations :

$$x + y = 4 \quad , \quad 2x - y = 2$$

[b] If $n(x) = \frac{x-1}{x+3}$ find $n^{-1}(x)$ and identify the domain of n^{-1}

[3] [a] If $n(x) = \frac{x^2 - 3x}{x^2 - 9} \div \frac{2x}{x+3}$, find $n(x)$ in the simplest form showing the domain of n .

[b] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$$x - 2y = 0 \quad , \quad x^2 - y^2 = 3$$

4 [a] If A and B are two events from a sample space of a random experiment and

$$P(A) = \frac{1}{2}, \quad P(B) = \frac{1}{3}$$

Find $P(A \cup B)$ if :

$$(1) P(A \cap B) = \frac{1}{8}$$

(2) A and B are mutually exclusive events.

[b] If $n(x) = \frac{x}{x^2 + 2x} + \frac{x-2}{x^2 - 4}$, find $n(x)$ in the simplest form showing the domain of n .

5 [a] By using the formula find in \mathbb{R} the solution set of the equation

$3x^2 - 5x + 1 \equiv 0$ rounding the result to two decimal places.

[b] Find the common domain in which the two functions n_1 and n_2 are equal where :

$$n_1(x) = \frac{x^2 + x - 12}{x^2 + 5x + 4} , \quad n_2(x) = \frac{x^2 - 2x - 3}{x^2 + 2x + 1}$$



22

South Sinai Governorate

Answer the following questions : (Calculator is permitted)

1 Choose the correct answer from those given :

(5) If the fraction $\frac{x-a}{x+3}$ is the multiplicative inverse of $\frac{x+3}{x+5}$, then $a = \dots$

(6) If A and B are two mutually exclusive events, then $P(A \cap B)$ equals

- (a) \emptyset (b) zero (c) $\frac{1}{2}$ (d) 1

[2] Find $n(x)$ in the simplest form showing the domain of n where :

$$(1) n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{x - 5}{x^2 - 6x + 5}$$

$$(2) n(x) = \frac{x^2 + 2x}{x^3 - 27} \times \frac{x^2 + 3x + 9}{x + 2}$$

[3] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :

$$y = x + 4 , y + x = 4$$

[b] By using the formula find in \mathbb{R} the solution set of the equation : $2x^2 - 5x - 1 = 0$ approximating the result to the nearest one decimal.

[4] [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

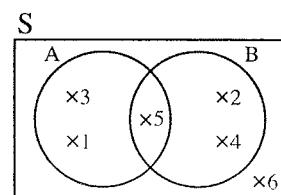
$$x - y = 1 , x^2 - xy = 0$$

[b] Use the opposite Venn diagram and find :

$$(1) P(A \cap B)$$

$$(2) P(A \cup B)$$

$$(3) P(A - B)$$



[5] [a] If the domain of the function n where $n(x) = \frac{b}{x} + \frac{9}{x+a}$ is $\mathbb{R} - \{0, 3\}$

, $n(6) = 7$ find the values of a, b

[b] If $n_1(x) = \frac{1}{x+1}$, $n_2(x) = \frac{x^2 - x + 1}{x^3 + 1}$, then prove that : $n_1 = n_2$

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Answer the following questions : (Calculators are permitted)

[1] Choose the correct answer from those given :

(1) The multiplicative inverse of $\frac{\sqrt[3]{2}}{3}$ is

- (a) $\frac{-\sqrt[3]{2}}{3}$ (b) $\frac{3\sqrt[3]{2}}{2}$ (c) $\frac{2\sqrt[3]{3}}{3}$ (d) $\frac{\sqrt[3]{3}}{2}$

(2) The S.S. of the two equations : $x - 2y = 1$, $3x + y = 10$ in $\mathbb{R} \times \mathbb{R}$ is

- (a) $\{(5, 2)\}$ (b) $\{(2, 4)\}$ (c) $\{(1, 3)\}$ (d) $\{(3, 1)\}$

- (3) Twice its square the number $\frac{1}{2}$ is
 (a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) 1
- (4) The domain of the function $f : f(X) = \frac{X-2}{7}$ is
 (a) \mathbb{R} (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{7\}$ (d) $\mathbb{R} - \{2, 7\}$
- (5) $X^2 + kX + 9$ is a perfect square if $k =$
 (a) 3 (b) -3 (c) ± 3 (d) ± 6
- (6) If the probability of failure of a student is 0.4, then the probability of his success is
 (a) zero (b) 1 (c) $\frac{2}{5}$ (d) $\frac{3}{5}$

[2] [a] Using the general formula, find in \mathbb{R} the solution set of the equation :

$$X^2 - 2X - 6 = 0$$

[b] Find $n(X)$ in the simplest form showing the domain of n where :

$$n(X) = \frac{X}{X-4} - \frac{X+4}{X^2-16}$$

[3] [a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the following two equations :

$$X - y = 2, X^2 - 5y = 4$$

$$[b] \text{ If } n(X) = \frac{X^2 + 3X}{X^2 + X - 6}$$

(1) Find : $n^{-1}(X)$ and find the domain of n^{-1} (2) If $n^{-1}(X) = 2$, find value of X

[4] [a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the following two equations graphically :

$$y = 2X - 3, X + 2y = 4$$

[b] Find $n(X)$ in the simplest form showing the domain of n where :

$$n(X) = \frac{X^3 - 8}{X^2 - 6X + 5} \div \frac{X^3 + 2X^2 + 4X}{2X^2 + X - 3}$$

[5] [a] A bag contains 15 balls numbered from 1 to 15, if a ball is drawn randomly, if the event A is getting an odd number and the event B is getting a prime number

Find : (1) $P(A)$ (2) $P(B)$ (3) $P(A - B)$

$$[b] \text{ If } n_1(X) = \frac{2X}{2X+4}, n_2(X) = \frac{X^2 + 2X}{X^2 + 4X + 4}$$

Prove that : $n_1 = n_2$

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Answer the following questions : (Calculator is permitted)

1 Choose the correct answer from those given :

$$(1) 3^{-2} = \dots$$

(2) If A and B are two mutually exclusive events in a random experiment

, then $P(A \cap B) = \dots$

(3) The solution set of the inequality : $X \leq 1$ in \mathbb{N} is

- (a) $\{1\}$ (b) $\{0\}$ (c) $\{0, 1\}$ (d) $\{0, 1, -1, \dots\}$

(4) The set of zeroes of f where $f(x) = \frac{x^2 - 9}{x - 2}$ is

- (a) $\{2\}$ (b) $\mathbb{R} - \{2\}$ (c) $\{3, -3\}$ (d) $\{3, -3, 2\}$

(5) If $n(x) = \frac{x-7}{x+3}$, then the domain of n^{-1} is

- (a) \mathbb{R} (b) $\mathbb{R} - \{-3\}$ (c) $\mathbb{R} - \{-3, 7\}$ (d) $\mathbb{R} - \{7\}$

(6) The point of intersection of the two straight lines : $y = 2$ and $X + y = 6$ is

- (a) (2 , 6) (b) (2 , 4) (c) (4 , 2) (d) (6 , 2)

• [2] [a] Find the common domain in which the two functions f_1 and f_2 are equal where :

$$f_1(x) = \frac{x^2 + 3x + 2}{x^2 - 4} , \quad f_2(x) = \frac{x^2 - 1}{x^2 - 3x + 2}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set to the following two equations graphically :

$$y = x + 4 \quad , \quad x + y = 4$$

[3] [a] Find $f(x)$ in the simplest form , showing the domain of f where :

$$f(x) = -\frac{x^2 - x}{x^2 - 1} + \frac{x + 5}{x^2 + 6x + 5}$$

[b] Find in \mathbb{R} the solution set of the equation : $x^2 - 2x - 6 = 0$

approximating the result to the nearest two decimals.

[4] [a] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 5}{x^2 - 4x - 5}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$y = x - 3, \quad x^2 + y^2 = 17$$

[5] [a] If the set of zeros of the function f where :

$$f(x) = ax^2 + bx + 8 \text{ is } \{2, 4\} \text{ Find the value of } a \text{ and } b$$

[b] If A and B are two events in a random experiment

$$, P(A) = 0.8, \quad P(B) = 0.7 \text{ and } P(A \cap B) = 0.6$$

Find : (1) The probability of non occurrence of the event A

(2) The probability of occurrence of at least one of the events.